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The "White Paper" Bungle

THE plans of the Government for giving legislative effect to the recommendations of the McGowan Report have been given a most inauspicious start. Indeed, few projected measures of a contentious character have been brought to the public notice in a way that was more likely to ensure them an unfavourable initial reception and a rough passage for any subsequent Bill during the Committee stage of its consideration by Parliament.

As everybody in the electrical world has known for some time, the Minister of Transport sent out a "confidential" document to representative bodies in the electricity supply industry as a basis for discussion. If this had confined itself to more or less technical aspects, the views of those with practical experience of electricity supply at its present stage of development would, no doubt, have been most helpful.

Unfortunately, however, distribution involves far more than problems of electrical engineering, and the document itself introduced (almost in the form of a Bill) all kinds of thorny questions relating to finance and to the very existence of most undertakings.

The organisations approached, being democratically controlled bodies, could not deal with the subject as one that concerned only a council elected for the carrying on of ordinary business, with the consequence that further copies of the "secret memorandum" were broadcast over the country and formed the subject of semi-public meetings. These gave rise to rumours which the Press was debarred from correcting by giving authentic information on the subject.

On Monday the ban was removed in a half-hearted sort of way and we are able to give in this issue an outline of the main provisions. Nevertheless, copies of the document are not yet obtainable through official channels, and at the time of our going to Press no arrangements had been made for their sale to the public.

Members of Parliament, have also been placed in an anomalous position, as those who are unconnected with the organisations referred to, or who have not obtained copies surreptitiously, have been kept in ignorance of matters of policy known by one means or another to many of their constituents.

This aspect assumes all the more importance in view of the virtual elimination of the smallest undertakings envisaged in the memorandum. Parliamentary powers were given to undertakings to supply electricity (which implies distribution), the possession of a power station being merely incidental. Yet the local feeling aroused on this incidental point during the passage of the 1926 Act should have warned the Government (assuming it to have been kept fully advised by the Minister of Transport) that any apparent encroachment on municipal enterprise would be received with suspicion.

Yet what is more likely to cause an outcry about the dangers of bureaucracy than any action that might lend colour to a charge that a scheme is to be imposed on the country behind the backs of its Parliamentary representatives after the Press has been silenced? The political influence of the smaller undertakings or of the companies is not to be measured by their sales of electricity.

The reason given for this secrecy by Dr. Burgin, who has inherited the distribution problem from Mr. Hore-Belisha (recently translated to the relative peace of the War Office), was that negotiations pending would be affected by disclosure of the proposals. This only added to the mystery, and a study of the various sections of the White Paper does not appear to give validity to this statement—rather the contrary.

In view of the form and tone of the document, how much attention will be given to representations made before June 30th, apart from those relating to obviously provisional details as to the grouping of undertakings?

If legislation is to be introduced, the sooner it is through the better—always provided that the proposals have been carefully thought out and are likely to meet with the approval, and therefore the willing co-operation, of the industry. In any case, Parliament will have the last word—this is more assured now than ever.

Telling the Nation

THE electrical industry is getting a good deal of publicity from the present discussions of the Government's distribution proposals, but whether it is advantageous is problematical. Some would argue that any kind of publicity is better than none—but that's as may be. Proposals made (or rather revived) at the annual banquet of the I.M.E.A. promise better results. Mr. H. T. Young referred to the National Convention of 1935 and asked if it were not possible to continue the good work of bringing all sections of the industry together, which was attempted on that occasion. He also emphasised the need for the proposed National Electrical Exhibition, pointing out that if the opportunity of holding it next year was allowed to pass it would be several years before Earl's Court would be available again. Mr. Frank Forrest reverted to the idea of a great headquarters in London to house all the electrical organisations, and thus demonstrate the magnitude and solidarity of our industry. All these projects mean great expenditure, but there is no doubt that the funds are available if we could find a body with the necessary authority and powers of persuasion and organisation to carry them through.

Refrigeration Development

SEVERAL noteworthy contributions were made to the discussion on the domestic refrigeration paper presented by Messrs. W. F. T. Pinkney and A. J. Ryan at the Brighton I.M.E.A. Convention last week. The woman's point of view was put forward by Miss C. Haslett, Mrs. C. H. Yeaman and Councillor Miss Walter. The first-named urged the necessity for stating a definite weekly cost, suggesting 2s. 6d. or 2s. 3d. as a suitable figure. Mr. L. L. Robinson wished to see greater enthusiasm for refrigeration on the part of showroom staffs and better training in the subject for salesmen. As to the latter point, Mr. Ryan drew attention to an appendix to the paper in which the authors gave some guidance in this matter. He also pointed to the advantages of securing the installation of refrigerators while houses were in course of erection—another aspect of the subject which has been prominent for some years now in relation to the whole electrical installation. Once a house has been built and equipped, the owner requires a lot of persuasion to add a complete electrical installation, even if he has the necessary money for it. Let us, then, cultivate the acquaintance of architects and builders.

Electricity on the Dairy Farm

ELECTRICITY is at its best in the small-power applications on the farm, and these are to be found more especially on the dairy farm, where small motors can be used for milking, grooming, pumping, cooling, cream separating and pasteurising, in addition to heaters for sterilising. For this type of work 2d. per kWh is considered to be a reasonable figure, while the gain in cleanliness and speed, and the saving of labour costs, should balance the capital outlay. Moreover, a penny per gallon extra can be obtained for "Accredited grade" milk, the production of which is facilitated by the employment of electricity. Rural developments have taken place at a rapid rate during the past few years. There are large areas where a running charge of only ¾d. per kWh is standardised, and many supply undertakings have an agricultural specialist to assist potential consumers.

The Modern Museum

THE expression "museum piece" has become, if not a term of reproach, at least a symbol of something out of date. The Science Museum, South Kensington, has shown, however, on more than one occasion that there is no need for this to be so. The television exhibition, which is to open there to-day (Friday) and to continue until September, has been undertaken to demonstrate that television has emerged from an experimental stage, to illustrate the principles underlying modern technique, and to foster an appreciation of it as a home entertainment. While it will include a "historical" section showing the course of development over the last ten years, the most important aspect will be the working demonstrations of cathode-ray receivers and of large-screen television by a mechanical-optical process. In this the view expressed by Sir William Bragg at the opening of the Very-low Temperatures Exhibition in the same building last year, that a museum ought to display the continual progress of science and its applications will once more find shape.

Census of Apparatus

ALTHOUGH the sale of electricity must provide the ultimate indication of an undertaking's progress, a knowledge of the extent to which different types of equipment is used is of value. In many cases the hire and hire-purchase schemes cover the majority of domestic electrical appliances connected to the public supply but there is frequently a good deal of small apparatus such as toasters and electric irons, of which the undertaking has no record. At Blackburn Mr. R. H. Harral has carried through a complete census of electrical apparatus installed in consumers' premises, and although it is a rule that all apparatus connected to the supply mains must be declared, the results show that very remarkable progress has been made in the installation of apparatus of which the undertaking, in many cases, was not aware.

The King's Roll

THE King's Roll was instituted in 1919 as a means of securing the employment of disabled ex-Service men. Firms, who considered it an honour to be enrolled, were required to employ such men to the extent of a certain proportion of their total staff. This proportion was fixed at 5 per cent. in 1926, but since that date the number of available men has been reduced, and in the House of Commons last week Mr. Walter F. Higgs asked if this percentage could be lowered. The Minister of Labour said that the King's Roll National Council had recently considered the matter and, while deciding that the percentage should not be altered, gave the local committees free discretion to accept a lower percentage if necessary.

The Tennessee Valley Scheme

THE contest between American utility companies and the Tennessee Valley Authority, which aims at large-scale hydraulic and hydro-electric development, reached a further stage recently. An injunction had been obtained by nineteen companies restraining the Authority from proceeding with its scheme pending the result of an action testing its constitutionality. A higher court, on the appeal of the Authority, has discharged the injunction, ruling that it was against public interest, as the public would suffer by failure to obtain the cheap electricity which the T.V.A. scheme promises and by the delay in the effective control of the flood-waters of the Tennessee River.

Not a Short-circuit

COMMENTING on the recent fire at Beaufort Castle, an evening newspaper said: "The cause of the fire is obscure. It could not have been a short-circuit, for Beaufort gets its electricity from the River Beauly, and when the river is low there is no electricity. There had been none for over a fortnight." We suppose that the industry's thanks are due to our contemporary for this very handsome acquittal—but why was electricity dragged in at all?

A Gloomy Thought

BRITISH visitors to the United States bring back an impression of continual radio—in streets, shops, restaurants, hotels and taxis it cannot be avoided. A recent advertisement suggests that radio may pursue the unfortunate American to the end—and after. An electrical manufacturing company announces in an American contemporary a "specially designed sound system for cemeteries, churches, mortuaries and undertakers."

Electrical Equipment at the Alvis Aero-engine Works (See next page)

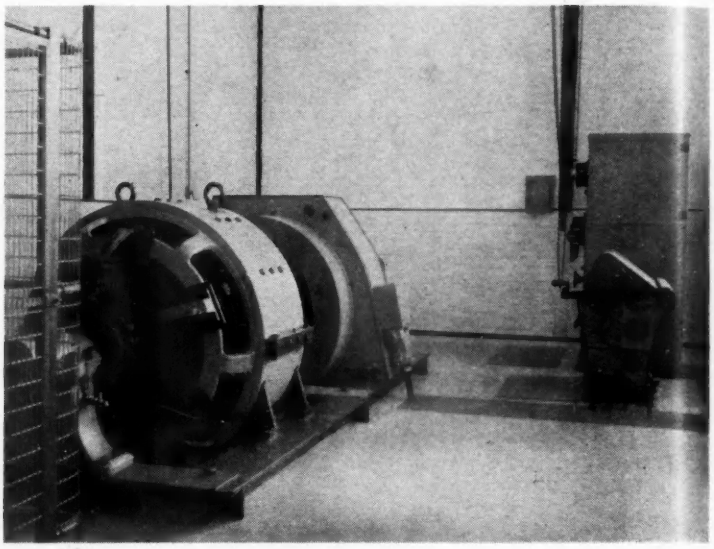
1. Main l.v. distribution: left, transformer unit; right, lighting board. 2. The dynamometer drive in the wind-tunnel machinery room. 3. The assembly shop furnaces. 4. Tool heat-treatment furnaces (left) and stabilising and nitriding furnaces. 5. The nickel-plating vats. 6. One of the tool furnaces

An Aero-engine Works Installation

Electrical applications in the Coventry factory of Alvis, Ltd.

APART from the specially designed equipment, we found the greatest interest in the electrical installation at the new aero-engine works at Coventry of Alvis, Ltd., in the machine shop. This represents one of the finest lay-outs anywhere, we should say, with its two hundred and seventy machine tools, all of them individually driven, many of them of precision operation, arranged in rows 300 ft. long. The main shop is 440 ft. long and 200 ft. wide.

To quote merely one unit as of outstanding distinction, a Keller die-sinking machine has four 110-V d.c. motors which are operated through relays from a desk-type control board with push-button switches. Three of the motors serve one vertical and two horizontal traverse motors; the fourth motor drives the cutter. A tracer follows the contour of the model located above the work. The tracer arm operates a multiple plug which, in turn, operates the various motors, with the result that the tool follows a path identical with that of the tracer.

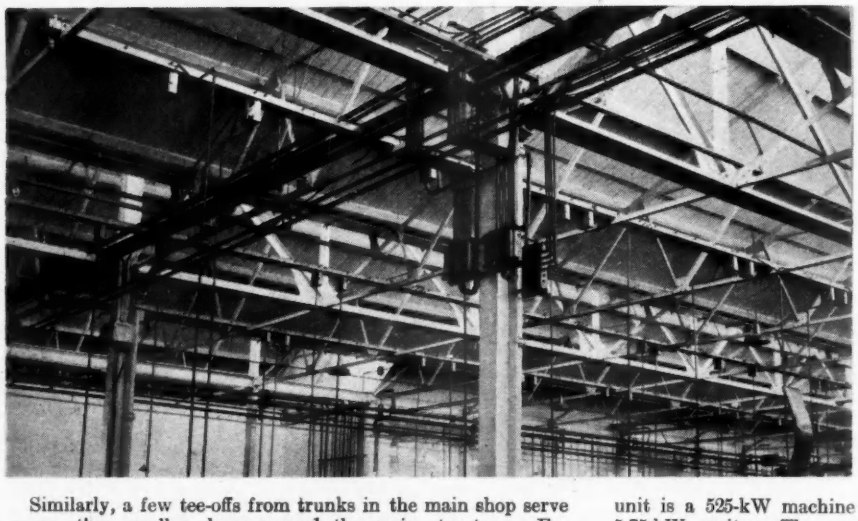


Synchronous motor-generator set and starting equipment for wind-tunnel plant

Practically all the machine-shop equipment is supplied from the Humbarton distribution system introduced by the English Electric Co., Ltd. Carried on the roof girders there is a distribution trunk directly over each line of machines. The trunk is of sheet-steel construction measuring 3 in. by 7 in. and having channel sides or ends. Three half-inch copper rods are held centrally and suitably spaced along the trunk and at every 16 in. a plug-in point formed by the moulded spacer is held by brass tubes clamped to the outer channels. These tubes serve for securing the plug-in fuse boxes in the connected position by means of through bolts and wing nuts.

From the fuse boxes conduit "drops" are taken direct to the machine, in most cases *via* "Memrex" foot-operated isolating switches at the bottom of the "drops." Five trunk lines are 168 ft. long and four are 84 ft. long, and an excellent connection scheme for the longer lines is a trifurcating box at the end of the lead-covered paper-insulated feeder seated on the trunk midway along its length.

A tool room is an annexe to the machine shop, and here there are a few belt-driven machines, because of superior operation of belt driving in these particular cases. Hence there is across the annexe at one end a single Humbarton line with tee-offs for a few group drives.



A section of the machine room showing the Humbarton distribution equipment

Similarly, a few tee-offs from trunks in the main shop serve some other smaller shops around the main structure. For instance, in the polishing shop a line of Gilman machines are served in this way. These machines are suspended by wire from the roof girders and are supplied *via* c.t.s. "drops" with rotary control switches secured direct to the motors. Each unit has a ¼-h.p., single-phase motor, driving a "Multiflex" polishing spindle *via* cone pulleys which afford three speeds with a maximum of 2,800 r.p.m. Motor-generator sets for supplies to magnetic chucks and variable-speed motors in the machine room are also fed by means of branch circuits from the distribution trunks.

Each line of the distribution system is fed from its own Ellison oil circuit-breaker on a central main distribution board. This is arranged with two sets of bus-bars and an isolating coupler so that, *via* the two B.T.H. ironclad l.v. cubicle switches, the 1,000-kVA transformers can be run separately or in parallel, or singly for the whole installation. These outdoor transformers are supplied at 6.6 kV from a B.T.H. truck-type switchboard which has a separate panel for a feed to the e.h.v. motor-generator set of what is termed the wind-tunnel plant.

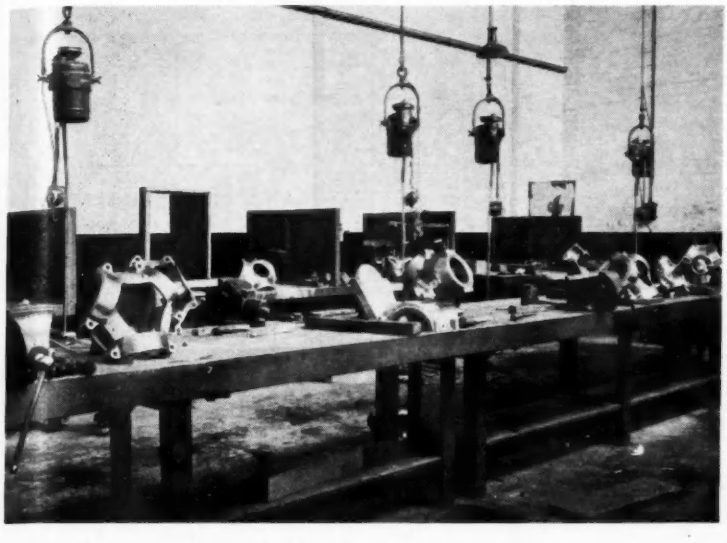
This is a special installation which provides within a carefully soundproofed structure what is claimed to be a practically 100 per cent. wind-tunnel silencer for dynamometer testing of a complete aeroplane engine while it is subjected to an air-blast for cooling equivalent to that created by the aeroplane flying at 190 m.p.h.

The dynamometer motor is a 150-h.p. d.c. machine, and it starts up the engine through the dynamometer. It can also be used for motoring purposes when "running-in" the engine. It is automatically switched off when the engine runs under its own power. The power unit overrides the electrical unit by virtue of excess speed, throwing out the clutch and, in turn, the switch and the contactor in the control room. The motor drives through Moss gearing which affords transmission in either direction *via* two-way dogs in the clutch.

The wind fan within the special trunking system for the wind blast is driven by a 250/550-h.p. d.c. motor with speed limits of 550 and 980 r.p.m. Controls for these two motors are situated in a separate soundproof room together with the dynamometer testing controls. The d.c. supply is obtained from the 790-h.p. synchronous motor-generator set with the direct 6.6-kV supply already referred to. The d.c. unit is a 525-kW machine and carried in tandem there is a 5.75-kW exciter. The synchronous motor is started up by direct stator switching and a liquid starter in the rotor circuit. All the wind-tunnel motors are of B.T.H. manufacture.

Not the least interesting part of the works equipment is a comprehensive heat-treatment installation. A pair of tool furnaces includes one for treating high-speed steels at up to 1,400 deg. C. and one for the preheating to 1,000 deg. C. for tools for treatment in the first furnace and for treating ordinary carbon steels at up to 1,000 deg. C. The high-speed steel

furnace is loaded at 20 kW and has hearth dimensions of 12 in. by 7 in. and overall dimensions of 4 ft. 6 in. by 4 ft. 8 in. by 6 ft. 3 in. To provide for the varying resistance (ageing) of the silicon carbide elements tap-changing transformer equipment is provided for voltage regulation to maintain constant load. By means of an external generator a non-oxidising atmosphere is maintained within the furnace and a definite screen of burnt gas is formed across the mouth of the furnace when the door is opened, so that the chamber is still



Suspended machines in polishing shop

sealed and the predetermined composition of the atmosphere is maintained unchanged.

Another team is a pair of furnaces for nitriding work, a method of surface hardening which has certain advantages over case hardening in that there is no sharp distinction between the temper of the case and of the core of the metal. We believe this type of furnace equipment has become standard for treating cylinders and crankshafts in aero engine works in this country. One unit, the nitriding furnace proper, has a fixed hearth with two containers each measuring 4 ft. by 2 ft. 6 in. by 2 ft. 6 in., and a movable furnace body which runs on rails and covers one container at a time. A circulating fan in each container ensures uniform temperature distribution and intimate contact of ammonia throughout the charge. The containers are rendered gastight by a powder seal for the covers, while the ammonia system is such that spent gas can be diverted into the second container to prevent the ingress of air during cooling and to purge it after recharging. The furnace is loaded at 55 kW and the necessary flexible connection is provided by a taped v.i.r. "drop" from the roof structure.

Leeds-Northrup control is provided for this furnace and one of the instruments acts as a safety device which switches off the equipment in the case of failure. It is set to operate at about 10 deg. above the normal temperature. The second unit of this team is a simple 30-kW oven in which the parts for subsequent treatment in the nitriding furnace are stabilised, that is, heated up to 500 deg. C. to relieve the internal strains brought about by machining.

Carburising and Tempering

A carburising or case-hardening equipment is an ordinary batch-type furnace with a rectangular chamber and an electrically operated loader. It is loaded at 110 kW, will deal with 20-cwt. charges and the makers say that the saving in consumption as the result of the mechanical loading will pay for the machine itself in a year or so. To compensate for heat leaks around the door this is itself equipped with an element.

A tempering furnace with a 4-ft. diameter vertical chamber is loaded at 60 kW, and because of the low-temperature treatment (up to 700 deg. C.) it is equipped with forced air circulation by means of a fan under the container which drives air upwards through the elements and downward through the container contents. By means of two suitably placed pyrometers the combined automatic temperature controller and charge progress recorder not only maintains the furnace at the desired temperature, but records this temperature with that of the charge on a single chart. Coincidence of the two records, red and black, shows that the charge has reached the set temperature throughout. For refining treatment of case-hardened material there is a 60-kW furnace with atmosphere control similar to that of the tool furnace.

In the assembly shop we saw an electrically heated castor-oil bath which is used for expanding connecting rods for the reception of the bushes. It is loaded at 16 kW, operated at up to 300 deg. C., and is controlled by a mercury in steel differential thermostat. A 20-kW furnace which operates at 450 deg. C. is used for heating cylinder heads before shrinking them on to the cylinders. All these furnaces were supplied by Birmingham Electric Furnaces, Ltd.

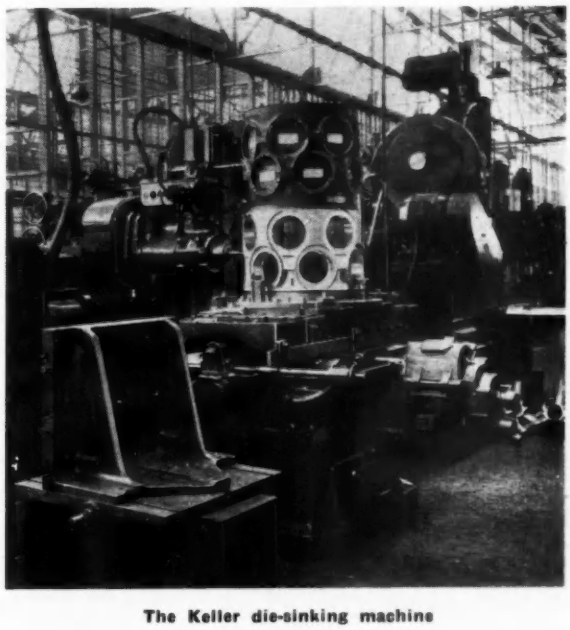
In a well-equipped plating shop we saw three large 500-A nickel-plating vats served by a 1,500-A, 6-V generator *via* tubular bars and regulating resistances, stripping and cleaning vats served by an 8-V, 500-W generator, a small cadmium plating vat supplied from the nickel installation system and an anodising equipment for the treatment of aluminium. Anodising appears to "amalgamate" a skin on to the metal. The anodic acid is continually circulated through a filter and the equipment is supplied by a 100-A, 6-V generator. The plating equipment was supplied by W. Canning & Co., Ltd.

Employing 500-W Benjamin industrial fittings the lighting installation in the machine shop presents an effective lay-out. At a height of 15 ft. from the floor rows of fittings are spaced 10 ft. apart and the fittings in the rows are spaced at 220 ft., but at different points, so as to give a staggered formation to the whole. Local lighting at the machines is afforded by Igranic "Lo-Vo-Lite" 25-V fittings which operate from transformers connected across two of the phases. Universal type flexible arms carry the fittings proper and are wired with waterproof automobile flexible cable.

Special attention to the lighting of the inspection shop, which measures 90 ft. long by 30 ft. wide, has resulted in a combination of eight 500-W gasfilled lamps (four on each side) and four 400-W mercury-vapour lamps situated in the centre line.

There is a similar combination lighting arrangement in the wind-tunnel machinery room which measures 60 ft. long by 30 ft. wide by 20 ft. high. There are four 250-W mercury discharge lamps and five 500-W gasfilled lamps in fittings recessed flush with the ceiling.

In such places as the "Genevoise" precision borer room and in the toolroom standards room, constant temperature is maintained to facilitate accurate operation of the equipment by thermostatically controlled tubular heaters.



The Keller die-sinking machine

On a separate circuit 40 synchronous clocks throughout the building are supplied with current from the main distributor board.

We are indebted to Alvis, Ltd., for permission to visit the works and to take photographs, and to Capt. Smith-Clarke, director and chief engineer, and his staff for help in collecting the above information.

Converting Water Heaters.

By C. K. Nidd

Two methods compared

THE widest field of application for domestic electric water heating lies in the conversion of existing hot-water cylinders, immersion heaters being used to boost up the temperature of water supplied from coal-fired boilers. For this purpose a circulator-type immersion heater is usually installed in the top of the cylinder, its main advantages being that it is comparatively simple to install, it can be more easily adapted to the space available and it rapidly raises the temperature of the water at the top of the cylinder.

Where special off-peak tariffs are available and water is heated solely by electricity, the choice of the type of heater and its position in the cylinder has to take account of the need for sufficient storage of hot water for use during the periods when the supply is cut off.

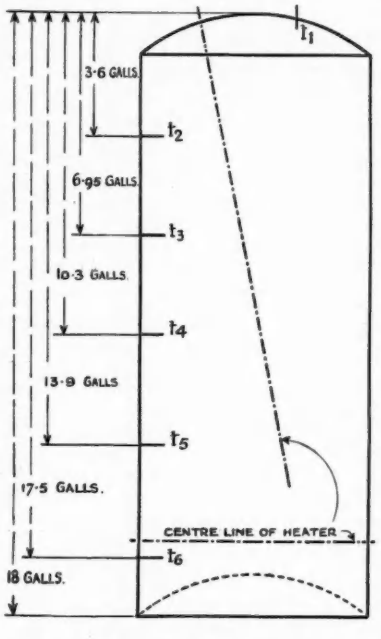


Fig. 1.—Diagram showing position of heaters

Tests were carried out in order to compare the performances of a 3-kW circulator immersion heater fitted through the top of an 18-gal. copper cylinder and a short-bladed 3-kW immersion heater fitted horizontally near the base of the cylinder as illustrated in fig. 1. The thermostats in both cases were set at 150 deg. F. on the grounds, first, that with a higher discharge temperature there would be a serious risk of scalding and, secondly, that higher temperatures have a marked effect on the deposition of solid matter from the water. The cylinder was completely lagged with canvas pillows filled with asbestos wool and held in position by steel bands. Fig. 2 shows that whereas the horizontal heater required 103 min. to attain the limiting temperature of 150 deg. F. as compared with the 75 min. taken by the circulator, the whole of the water in the cylinder was then available at the required temperature. Using the circulator only, 20 per cent. of the contents was raised to 150 deg. F., 40 per cent. being below 100 deg. F., which is too low for ordinary domestic requirements.

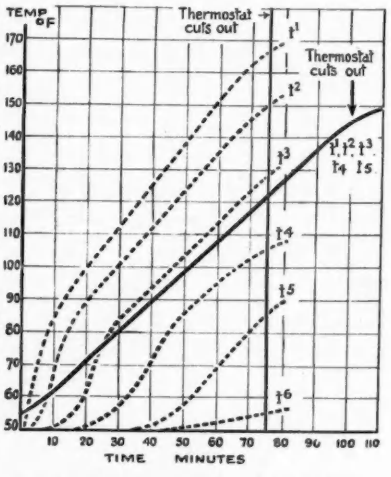


Fig. 2.—Heating curves; broken lines for the vertical circulator and continuous line for the horizontal heater at the base of the cylinder

The heating curves of the circulator illustrate the effect of a long thermostat fitted alongside the heater. As the operating portion of the bi-metal strips occurs in the region of the centre of the cylinder, the temperature of the water at the top of the cylinder was allowed to rise considerably above the temperature setting of the thermostat. The thermostat fitted adjacent and parallel to the horizontal heater allowed a much closer setting of the maximum temperature, since a temperature rise of only 2 deg. F. occurred after the thermostat had cut out. The effect is further shown in the curves given in fig. 3 of temperature variation under thermostatic control. The maximum temperature variation obtained with the horizontal heater was 9 deg. F. as compared with 15 deg. F. with the circulator.

The rate of standby losses due to radiation from the surface of the cylinder estimated over a period of twenty-four hours proved to be 0.08 kW in the case of the horizontal heater and

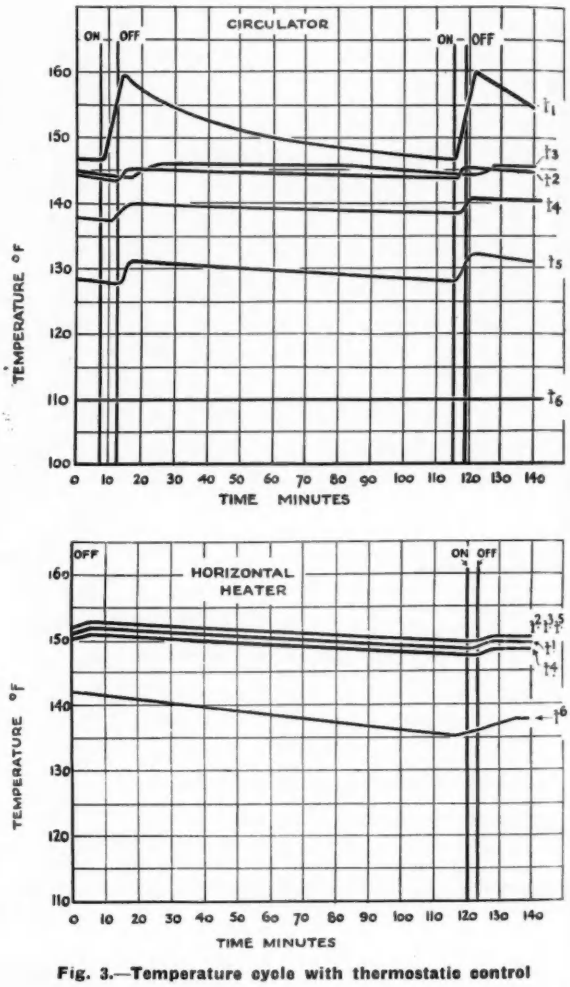


Fig. 3.—Temperature cycle with thermostatic control

0.09 kW with the circulator. These rates of loss were obtained in periods during which no water was drawn from the tank and, of course, would be less when water was drawn off intermittently, due to the reduction of the temperature of the water in the cylinder. With an unlagged cylinder the rate of standby losses became approximately 0.4 kW, an increase of 400 per cent., which clearly demonstrates the need for efficient lagging in these installations.

The increase in the quantity of hot water available from a cylinder with a horizontal heater fitted at the base was again shown when the temperature of the water was recorded at a tap connected to the cylinder by a length of ½-in. lead piping, during a draw-off of 22 gal. With the circulator, the temperature immediately began to fall gradually from 145 deg. F. and was reduced to 116 deg. F. after 17 gal. had been drawn off, after which it fell rapidly to the temperature of the make-up water; with the horizontal heater the temperature remained constant during a draw-off of 15 gal.

In a draw-off of 17 gal. in the first case the heat content of the available water was 17,400 B.th.u., and in the second was 19,200 B.th.u., an increase of over 10 per cent., which is a considerable advantage in systems operating during off-peak periods when the storage of hot water is an important item.

These tests make it apparent that although the circulator type heater largely holds the field where the electric water heating is supplementary to the coal-fired boiler, in installations operated entirely by electrical means and supplied during off-peak periods there is a considerable number of advantages to be obtained by installing the immersion heater at the base of the cylinder.

Stators for Small Motors

By Stuart F. Philpott, A.M.I.E.E.

THE most expensive individual operation in the manufacture of fractional-horse-power motors is the winding of the stator. Single-phase motors of the split-phase type have two sets of windings, the main (running) and an auxiliary, which is usually, though not always, cut out of circuit when the motor has started. The auxiliary poles are spaced midway between the main poles.

Stators for fractional-h.p. motors usually have 24, 32 or 36 slots and more often than not are wound for four poles to give a running speed of about 1,440 r.p.m. (1,500 synchronous) on

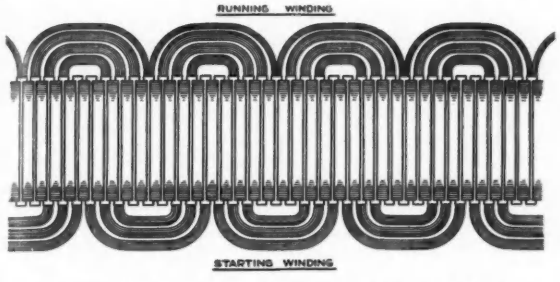


Fig. 1.—Developed winding diagram for 36-slot single-phase stator

50-cycle supply. Two-pole, and to a lesser extent six-pole, machines are also used.

The developed layout of the complete winding of a typical 36-slot 4-pole stator (fig. 1) shows running coils at the top and auxiliary coils at the bottom. The slot opening is small and usually only sufficient to admit one wire at a time. The bore may be as small as 2 in. in diameter for 1/20 h.p. (3½ to 4 in. for ¼ h.p.) so that the insertion of the wires in the confined space calls for some dexterity.

Slot Insulation and Wire

Slot insulation varies with different designs of motor. A combination of empire cloth and leatheroid is satisfactory for domestic voltages. Leatheroid or similar material alone is sometimes used. Three methods of cutting slot insulation are shown in fig. 2. In A both leatheroid and empire cloth project above the slot, these being cut short at X after winding and folded into the top of the slot. This is a safe method, but is wasteful (particularly of empire cloth, a relatively expensive material) and tends to block the space for inserting the wires.

In B the empire cloth is cut in the form of a trough, only the leatheroid projecting to guide the wire into the slot. Pro-

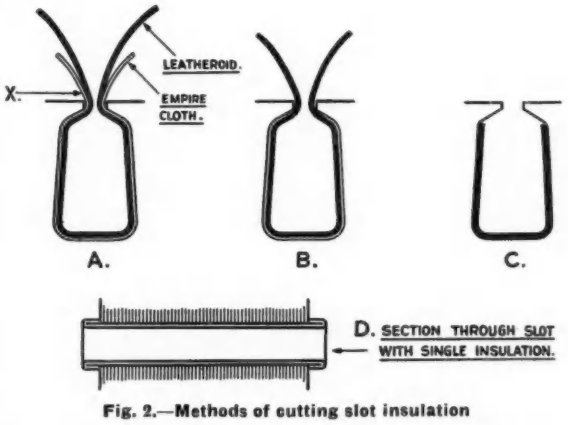


Fig. 2.—Methods of cutting slot insulation

vided the empire cloth is cut and inserted carefully, this is probably the most satisfactory method of insulating. In C only one layer of insulation is shown, cut as a trough, and can only be used where metal guides are used to lead the wire into the slots. It will be appreciated that unless some form of guide is provided the wire is very liable to be chafed, or even broken, against the sharp edges of the opening of the slot. An advantage of this trough system is that ends of the insulation may be folded back as at D to give additional strength to the ends.

The slot insulations may be cut on a guillotine and folded by hand or may be produced by machine and formed ready for use.

All types of wire insulation have been used with satisfaction for winding stators. Enamelled wire is the cheapest and is satisfactory, provided it is handled with care and precaution taken to insulate between coils.

Cotton-covered wires are not so easily damaged, are not unduly expensive, and, particularly the "fine" variety, give a fairly good space factor. Enamelled wire with a single covering of cotton is used extensively. A covered wire is practically essential in all cases, except former winding, owing to the bending the wire receives.

Several methods of winding are in use, the selection depending to a great extent on production methods. A repair shop handling a variety of work in small quantities has a different set of problems from those of a manufacturer engaged on the mass production of only a few sizes of motor to be sold in keen competition.

Former Winding

In former winding the coils are wound on formers and are then inserted, one coil at a time, into the stator slots. Fig. 1 shows that there are four different sizes of coil for each main pole, so that at least four formers are wanted and it is often necessary to make more formers for the auxiliary coils, owing to their different span and thickness.

For jobbing work hardwood formers are quite satisfactory, and the most economical way of producing them is to use a treadle fretsaw. Fig. 3 shows a typical former for repair work and a coil as produced. The same checks may be used for all sizes of former. Coils are tied temporarily with thin string, this being removed prior to inserting the wires.

The former method of winding is also used extensively for

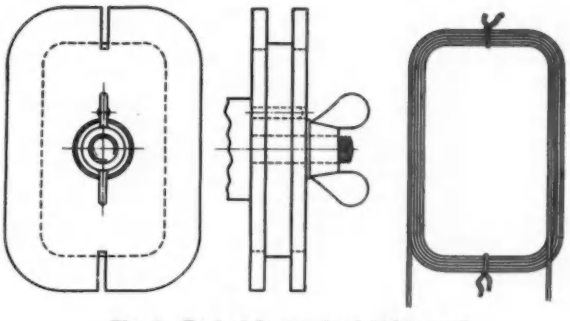


Fig. 3.—Typical former for jobbing work

mass-produced motors, and here more elaborate methods are in use. The coils for each pole are usually wound in succession on a winding head, such as shown in fig. 4. The lead from one coil to the next is left intact and this simplifies and cheapens the connecting up of the finished motor.

The cheeks between the formers A are made to withdraw into the body of the former (by operation of knob B) to permit quick removal of the coils. The coils are tied in two places with string, or small horseshoe magnets with sheet steel armatures may be used with advantage, as at C. Given a sturdily built machine with rapid control and braking, and a good turn counter, very fast production can be obtained.

The quick and neat insertion of former wound coils, particularly when wound in groups of three or four coils, having regard to the small working space, calls for considerable skill, which can only be obtained by practice and, in the small size motors, is invariably done by female labour.

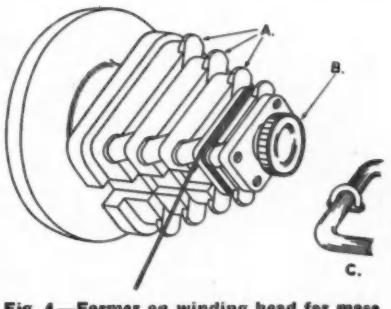


Fig. 4.—Former on winding head for mass production

Skein Winding

This method requires considerable practice to obtain proficiency. It makes a jointless winding without the necessity of winding and handling several distinct coils as described. The initial determination of skein length is apt to be wasteful when only one or two motors are to be wound.

The whole of the wire for one pole is wound in a single loop or skein as at A in fig. 5. In winding the loop is made

in one side of the skein as at B and laid in the slots as at C. Another loop is then made as at D, and this is inserted in the same two slots. Another loop in the left side as E enables another pair of slots to be half filled, while the insertion of yet another loop on the right completes the winding as at F.

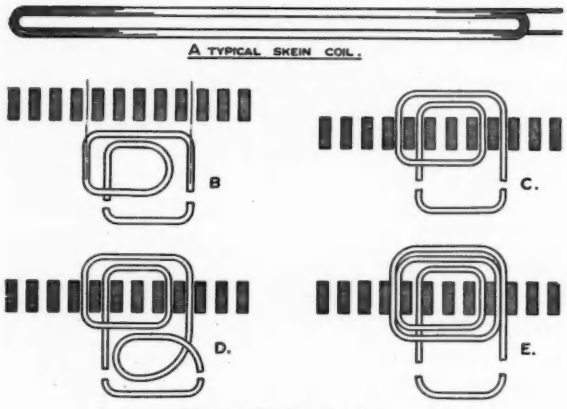


Fig. 5.—Skein winding

The method of putting in two bundles of wires instead of one of double thickness gives a thinner and more easily managed skein.

Hand winding is the simplest with regard to preparatory work, as no formers or other equipment is wanted, the wire being wound straight off the reel into the slots by hand. The usual method is to form a loop externally and then drop the loop in, pulling it tight before inserting the next wire. Hand winding is slow, and becomes slower with smaller motors and higher voltages, owing to the increased number of turns to be inserted. Rods are sometimes put through the tops of the slots to keep the coil ends down, but the operator frequently does this by hand.

Gun Winding

Gun winding is a modified and quicker system of hand winding, so called because it employs a winding tool similar to that shown in fig. 6, which has been likened to, and is, in fact, generally called, a gun. Its main object is to enable the winding to be done without passing the hands through the bore of the stator.

The wire enters through the breech A, and, passing through the barrel B, leaves through the muzzle C; D is the handle and E a brake lever which enables the wire to be gripped at F.

The operator holds the gun in the right hand and winds a turn with little or no tension. At the end of the revolution the wire is momentarily gripped by the brake and the wire given a pull to set it in place. Rods or guides are put through the centre slots of the pole to guide the ends of the coils to correct shape.

When the operator has attained skill in braking, the gun winding method shows considerable saving of time over ordinary hand methods and is less tedious to the operator. As there are no formers to make, this method is very useful for repair work or for small quantity or experimental production work. The entire winding can be put on without breaking the wire, thus saving all connecting up operations.

Machine Winding

This is one of the most recent developments in stator winding. The mechanisation of such a complex operation has called for very careful motion study of the movements involved and the exercise of much ingenuity to produce a machine which, in addition to reproducing these movements automatically, gives a quality of winding equal to, or better than, any existing method and at a much lower cost.

Machine winding is only practicable when large quantities of a standardised line of motors are being manufactured, and for this reason all the development work in connection with these machines has been done by the motor manufacturers themselves. In one system the machine forms each turn of the coil being wound, external to the stator, then by another motion inserts it in position. In another system an internal arm winds the wire directly into the slots, suitable guides and cams being provided to give the necessary motion.

After the coils are inserted the pole groups are connected up and wood or fibre wedges inserted in the tops of the slots.

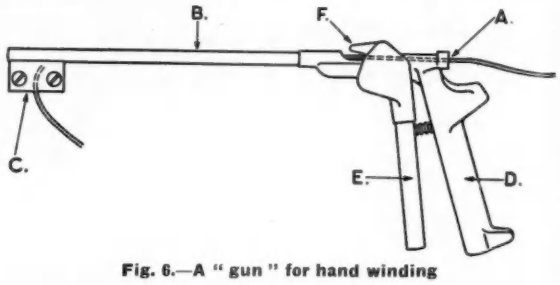


Fig. 6.—A " gun " for hand winding

To secure economical production some care is necessary in producing these wedges so that they shall be neither excessively tight to drive in nor loose. After the test the stator is ready for varnishing.

Electrical Expansion at Manchester

INDUSTRIAL power sales in the district served by the Manchester Electricity Department showed a steady growth of 22 million kWh, equalling 9 per cent. in the year ended March 31st last. This expansion was substantially fostered by the demonstration workshop at Dickinson Street. Four trade demonstrations, an electric vehicle conference on a large scale and twelve lecture demonstrations were held during the year. To the electric vehicle conference goes much of the credit for the increasing adoption of this means of transport around Manchester. At the end of March, according to an estimate by the Department, there were 125 such vehicles operating in the area.

Several large electric furnaces and welding plants were connected to the public supply during the year, while thirteen new agreements were signed for large power and lighting supplies at high voltage. The net increase in motive power connected was 5,411 kW. Increases in sales were allocated as follows:—Engineering, 23 per cent.; rubber, 14 per cent.; chemicals, including dyers and finishers, 4¼ per cent.; miscellaneous, including railways, public works and large stores, 4 per cent.; and textiles, 2¼ per cent.

Bulk supplies to other undertakings decreased by 25 million kWh, mainly through the transfer of part of the Stretford supply to the Central Electricity Board. Thus, the increase of 11 million kWh, or 2 per cent., in the sales of the Department (excluding export to the Central Electricity Board) does not represent the real rate of progress.

In all, the Department's power stations produced 814 (against 741) million kWh, of which 509 (498) million kWh was required in the area and for bulk supplies. The total fuel consumption was 533,880 tons and the average price 15s. 7d. per ton.

Apart from industry, there was considerable expansion in other fields. At the end of March there were 21,128 cookers on circuit, mostly hired from the Department. Electric water heating grew in favour, as was evidenced by the steady advance in the number of appliances installed. At March 31st the totals were:—Wash boilers, 3,128, and water heaters, 4,430, including a number of large commercial installations. It is also noted in the Department's report that the advantages of electric refrigeration are being recognised.

Last year the second of six large blocks of electrically equipped flats for tenants from clearance areas was officially opened, electricity being used for lighting, cooking and supplementary heating. In the lighting, heating and cooking category the increase in sales generally was 12 million kWh, or 11 per cent. For street lighting, consumption rose by ½ million kWh (4 per cent.), the number of electric lamps increasing by 929 to 10,319. It is reported that the method of control by injecting trains of high-frequency impulses between the distribution system and earth at some central point has proved reasonably satisfactory and is being extended in certain areas. The consumption of the Transport Department for traction increased by one million kWh, or 3 per cent.

A further 3,695 premises were changed over to a.c., making the total already dealt with 38,030. Those that remain are mainly industrial and commercial. As a result of research carried out within the Department a method of testing four-wire a.c. distribution networks has been devised and is in regular use. Tests can now be made without in any way interfering with the supply to consumers. Recent legislation in regard to meter testing will involve extension of equipment and accommodation. On the subject of meters, it is also mentioned that there was a marked growth in the demand for the prepayment type in the early part of 1936-37, the number issued increasing from 6,698 to 10,525.

Important plant extensions were in progress during the year. Next autumn an additional 50,000-kW set at Barton will be ready for service, bringing the total installation at the station up to the limit of the site capacity (172,500 kW). A start was also made on a 30,000-kW set at Stuart Street.

Financially, the past year resulted in the Department's reserve fund being augmented by a net surplus of £68,020. At the end of March this fund stood at £911,649, equalling 6.35 per cent. on the aggregate capital outlay and 13.48 per cent. on the loan debt. Revenue in 1936-37 was £2,109,449 (against £2,067,112), and working expenditure, inclusive of all generation costs, £1,494,518 (£1,449,981).

The Brighton Convention

Final proceedings

THE annual banquet of the Incorporated Municipal Electrical Association was held on June 3rd at the Dome, Brighton. The President (Mr. F. Forrest) was in the chair, and there were present nearly 600 delegates and guests. At the conclusion of the banquet a cabaret was given on the invitation of the Birmingham Electric Supply Committee.

Mr. H. T. YOUNG (President, I.E.E.), proposing "The I.M.E.A.," spoke of the advances that had been made in electricity supply by both municipalities and companies as unequalled in any other country. Electricity had been made available to small industries as well as large and to poor and rich alike for cooking, lighting and heating. He characterised Mr. Forrest's undertaking (Birmingham) as a fine example to the rest of the country, and referred to the presidential address to the Convention as an example of careful thinking. The members of the Association had not allowed local patriotism to stand in the way of great national interests. They had helped research and supported such bodies as the British Standards Institution and also the work of the Institution of Electrical Engineers, on the Council of which they had several members. The Coronation illuminations reflected considerable credit on municipal and company electricity supply engineers throughout the country.

After paying a tribute to the work of the E.A.W., Mr. Young asked whether something could not be done to continue the work of the National Electrical Convention of two years ago, the purpose of which was to further the co-operation of all sections of the industry, which would be of enormous value not only to the industry itself but to consumers. E.D.A. was hoping to hold a big national electrical exhibition at Earl's Court next year and desired supply undertakings, manufacturers and contractors to join in. A decision had to be taken shortly because unless the building was booked for 1938 it would not be available for several years. It seemed to him, and to many people interested in electricity supply, that this would be a most appropriate time to hold such an exhibition. There had not been anything of the kind since 1911, and it was time that the electrical industry showed the public what it could do. Such an exhibition, he believed, would be an eye-opener because it would display examples of the various applications of electricity, including communications, transport, navigation, broadcasting, and on the domestic side. He knew it would have the support of the I.M.E.A. as well as of the I.E.E.

The PRESIDENT, responding to the toast, said that the Institution represented by Mr. Young was numerically the largest technical institution in the world and the most influential. It was able to debate the developments in electricity in an atmosphere of academic calm, but the I.M.E.A. was less fortunate, and had to concern itself with such sordid matters as costs and prices and grid tariffs and how to get the better of the Central Board under Section 13! Members of the I.M.E.A. were trying to make supply available not only to the man in the street but the man in the back street. The municipal electrical engineer had to be something of a scientist and a good deal of a salesman. He had to have some knowledge of the law, and often worked under difficult conditions. He was in full sympathy with Mr. Young in his reference to the need for greater co-operation between all sections of the industry and advocated the housing of all the organisations connected with the industry in one nobly planned and suitably equipped building in London. Such a building would demonstrate to the world where the electrical industry as a whole really stood.

A great deal was heard to-day about the McGowan Report and a "highly confidential" document which had been issued by the Government. Whilst they all agreed that some form of reorganisation in the distribution of electricity was necessary, he felt that the interest which had been taken in this particular document would have been much greater if the industry were doing badly, but it was not. It was progressing by leaps and bounds, the average rate of progress being about 12½ per cent. per annum, compound interest—which meant that the output was being doubled every seven years. What reorganisation was going to increase that rate of development? It was difficult enough to-day to handle the rate of growth of the various supply undertakings because of the want of skilled labour.

Alderman H. ROBERTS (Lord Mayor of Birmingham) proposed "The County Borough of Brighton," and Councillor E. DENNE (Deputy Mayor), responding, said that Mr. Arthur Wright, the engineer at Brighton at the time, took a leading part in the formation of the Association. One of the colliers owned by the Electricity Department had been given the name of *Arthur Wright*. THE MAYORESS OF BRIGHTON also briefly responded.

Mr. W. J. BACHE (Vice-President) proposed the health of the guests, on whose behalf Sir Archibald Page (chairman of the Central Electricity Board) responded, stating that in any scheme of reorganisation what was best for the consumer was the paramount consideration.

The Women's Luncheon

Women's interest in the Convention was well in evidence on Thursday last week, when over four hundred members of the Electrical Association for Women and their guests were present at a lunch held at the Prince's Hall. The need for paying more attention to keeping the atmosphere clean was the principal theme of Mr. FRANK FORREST's speech in proposing the toast of "The E.A.W." Medical officers of health, he said, gave considerable attention to the contamination of food and water, but since the average adult consumed about 30 lb. weight of air per day and only 2¾ lb. of food and 4¼ lb. of water, it was more important to have clean air. It was often said that manufacturing towns were worse in this matter of atmospheric pollution because of the factory chimneys, but statistics showed that in London the amount of dirt and smoke was greater than in manufacturing towns.

Electricity was one of nature's greatest forces and would never be superseded: its rival, gas, was only a form of manufactured fuel. Electricity was, in fact, eternal while gas was only temporal. Women could influence architectural design, especially with regard to kitchen planning. Mr. Forrest suggested that lighting should be used more extensively for decoration purposes and he was glad to think that new factories built would insist on a certain degree of illumination. The electricity supply industry was indebted to the E.A.W. for the training of demonstrators.

In response, Bailie Mrs. ROBERTS, convener of the Glasgow Electricity Committee, spoke of the changing attitude towards women in public and business life. Women, she said, had no wish or right to claim a position just because they were women. The only justifiable reason was because they were capable and the E.A.W. was training them to become so.

A welcome to Brighton was tendered by Councillor E. DENNE, the Deputy-Mayor, and in reply the Lord Mayor of Birmingham (Councillor H. ROBERTS) returned greetings from Birmingham. The chair was taken by Councillor Mrs. GREGORY, chairman of the E.A.W.

Annual General Meeting

At the annual general meeting on June 4th the following officers and members of council were elected:—*President*: Mr. W. J. Bache (chief electrical engineer, Cheltenham); *Vice-President*: Mr. H. C. Lamb (chief electrical engineer, Manchester); *Council*: Engineers, Large Undertakings: Messrs. W. P. Lilwall (Fleetwood), C. H. Yeaman (Stoke-on-Trent), G. C. Milnes (Lancaster). Mr. J. W. J. Townley (West Ham) was elected to fill the vacancy created by the election of Mr. Lamb as vice-president. Engineers, Small Undertakings: Mr. H. Breckell (Gainsborough). *Local Authority Representatives*: Alderman Sir P. Bower (Birmingham), Alderman J. H. Beck (Mansfield).

An invitation to hold next year's Convention in Cheltenham was referred to the Council for decision.

The meeting proceeded to discuss the Government's reorganisation proposals and the discussion was resumed after the luncheon interval.

A Trip to Shanklin

Owing to the adjournment of the annual general meeting Friday afternoon's sea trip to Shanklin was not so well attended as it might have been. Still, the hundred or so who were able to go must feel all the better for the invigorating breeze on the outward journey and the warm sunshine on the return. The three-quarters-of-an-hour's stay at Shanklin was all too short, but even so, the boat did not get back to Brighton until 10.15 p.m.

Domestic Electrical Refrigeration

The paper on this subject by Messrs. W. F. T. Pinkney (North-Eastern Electric Supply Co., Ltd.) and A. J. Ryan (borough electrical engineer, Hastings) presented at the I.M.E.A. Convention was abstracted on page 841 of our last issue.

The discussion on June 3rd was opened by Miss C. HASLETT (Electrical Association for Women), who said she would like to see the electrical industry do what the gas industry had done, *viz.*, give the housewife a definite figure per week at which refrigeration could be obtained. At present hire-purchase charges varied, and she urged that 2s. 6d. per week or even 2s. 3d. should be adopted throughout the country. More

attention should also be paid to demonstrations, while demonstrators themselves were in need of help. Mrs. C. H. YEAMAN (Stoke-on-Trent) spoke of the relation between refrigeration and food preservation.

Mr. L. L. ROBINSON said the paper would serve as an excellent text book for sales managers throughout the country. After expressing preference for the compression type of apparatus, he went on to say that electrical advertising in some respects did not have the force, the volume, or the "pep" which gas advertisements had, and strongly urged chairmen of committees to go back from the Convention and table a resolution doubling the contribution to E.D.A. and quadrupling the amount hitherto spent on advertising. What was being done to-day by way of preparing the ground for the salesmen was not nearly enough. Moreover, in the matter of sales staff training a great deal remained to be done. If one went into

The E.D.A. stand at the Convention which stressed refrigeration

the average electrical showroom to-day one was not received with vigour and enthusiasm, nor was one answered as intelligently as was desirable. To shut down a refrigerator in the winter was a wrong policy, as when it was started up again there would probably be leakage of the gas, and the replacing of that gas would probably cost more than the electricity saved during the winter when the apparatus was not in operation. At all events, the refrigerator should be run for an hour once a week if it were not regularly used during the winter. The cooling element of the earlier apparatus was made of brass or copper, which was silver soldered and electrically tinned. But the authors now referred to steel which had a lower heat transmission. In one case the cooling elements were of white enamel, which made the heat emissivity as bad as it could be. The atmosphere in this country was rather humid and he had found that de-frosting once a week was well worth while.

Councillor Miss WALTER (chairman, Worthing Electricity Committee) said that electrical refrigeration enabled flowers to be used in the electricity showroom and that should be made a point of as against gas. She urged that builders should be encouraged to install refrigerators and other electrical apparatus when building, although it was true that in some of the modern houses and flats there was hardly room to put in a vacuum cleaner, and in what was termed the kitchenette there was often very little room to put a refrigerator.

Councillor H. A. SALE (vice-chairman, Birmingham Electricity Committee) said that he would like to suggest to manufacturers the possibility of having a self-contained unit embodying a cooker, a refrigerator and a water heater for the kitchen, especially for the larger kitchens in houses which were built some years ago. It might also be possible to arrange a shelf on the top of the refrigerator and with such an arrangement there need only be one service, thus simplifying wiring considerably.

Mr. J. I. BERNARD (E.D.A.) remarked that further development would be much more easily accomplished with the backing of the supply authorities, which assured the public that they would stand behind anything they sold and would see that the public obtained good service. The fact pointed out in the paper that during a cold month the temperature in a larder could be as high as 55 deg., and in some cases 65 deg., was of great importance. The prices of refrigerators were not unduly high, having regard to the rising prices of raw materials, although it was to be anticipated that prices would fall with an increasing demand. The E.D.A. refrigerator campaign, which was timed to follow immediately after the Convention, would make use of papers and journals with 10½ million readers.

Mr. A. J. RYAN, in the course of his reply to the discussion, said he hoped there would be some standardisation of hire-purchase terms throughout the country. The authors agreed with Mr. Robinson that the compression type of machine was superior to the absorption type. Regarding better salesmanship, the authors had put an appendix in their paper with the object of assisting in that direction.

There was very little difference indeed between the efficiencies of the older type of cooling element and the pressed-steel element. One of the principal advantages of the "freon" gas was that it had a much lower boiling point than SO_2 (−21 as against +14 deg. F.). At the same time, there was very little difference between the prices of "freon" and SO_2. Moreover, it had practically all the advantages of ammonia and none of its vices. It was a nuisance to the householder to be continually having the floors and walls of his house interfered with in order that further electrical apparatus could be installed, and anything which would reduce this would be welcomed. One way was to get the builders to put in refrigerators in the first place. If the public would assist by increasing the demand the price of refrigerators would come down.

Parliamentary News (BY OUR SPECIAL REPORTER)

The Reorganisation Proposals

ON June 2nd Mr. Graham White asked the Minister of Transport if he would have a copy of the memorandum on the McGowan Report, which was submitted to the electricity supply undertakings, placed in the Library of the House; and if he would state to whom the document was sent.

Dr. Burgin said that the memorandum in question, having been a confidential document circulated to interests concerned, he was unable to accede to the suggestions made by the hon. member.

Replying to further questions, which stated that the document had already appeared in the Press, Dr. Burgin said that the whole conduct of the negotiations in progress would be affected if their confidential character were changed. This confidential document had been circulated to interested parties and negotiations were pending as a result. In due time a communication would be made, but he begged the House not to affect prejudicially negotiations which were proceeding satisfactorily and which were of a confidential character. Certain information purporting to be extracts from the document had appeared in the Press, but it was neither complete, nor, so far as he knew, accurate.

On June 3rd Sir John Simon, the Chancellor of the Exchequer, promised to call the Prime Minister's attention to the matter. He agreed that the position was anomalous, but when negotiations were pending he could not make a rash announcement till he knew exactly what was involved in the matter.

On June 7th Mr. Attlee asked the Prime Minister if he had anything to add to the statement made the previous week by the Chancellor of the Exchequer with regard to the memorandum.

Mr. Chamberlain said that in some quarters a somewhat liberal interpretation seemed to have been placed on the words "Confidential, not for publication," printed on the document. In the circumstances, directions had been given that a copy of the document should be placed in the Library. A limited number of copies would be made available as soon as possible.

Mr. Ede asked if this document would be purchasable by members of local authorities owning electricity undertakings and other persons.

Mr. Chamberlain said he understood not yet.

In reply to a further question, however, the Prime Minister indicated that the memorandum would eventually be placed on sale.

Kent Electric Power Bill

This Bill, which has passed the Lords, was read a second time in the House of Commons last week. It provides for the erection by the Kent Electric Power Co. of a large new station at Stone, near Dartford.

Electricity Charges in London

In the House of Commons on June 2nd Mr. Duggan asked the Minister of Transport if he would make representations to the London Associated Electricity Undertakings, Ltd., that they were not carrying out the recommendations in the McGowan Report with regard to uniformity of tariffs, and whether he was aware that the ordinary lighting rate of this voluntarily formed group of companies varied from 3½d. to 4½d. per unit.

Dr. Burgin said he understood that the London Associated Electricity Undertakings, Ltd., had introduced new tariffs which brought about a greater measure of uniformity than hitherto in the areas of the constituent companies. While the alternative flat rates for lighting varied between the different areas, as indicated by the hon. member, there was a common domestic two-part tariff available in all the areas.

The Government's Distribution Proposals

Contents of the "White Paper"

AS we mention in our leading article, the Government has decided to make public the "confidential" memorandum containing its proposals for the reorganisation of the distribution of electricity.

We are therefore now in a position to give a full outline of the document which is in the hands of the appropriate organisations for consideration. The time for representations to the Minister of Transport has been extended from the beginning to the end of June. The following are the principal proposals:—

PARAS. 1 TO 6.—Thirty distribution districts, generally covering counties or parts of counties, are defined in an appendix (A). The Electricity Commissioners will prepare schemes for consolidating the undertakings in each district into groups (to the sumber of seventy-six in all), which are also provisionally set out in the appendix. These may be adjusted as a result of consultation with the undertakings concerned. A single undertaking may be the subject of a scheme.

Compulsory Amalgamations

PARA. 7.—The Electricity Commissioners are to be empowered to prepare schemes for the compulsory amalgamation of undertakings on one of the following bases:—

Basis A.—The acquisition by one undertaking of the other existing undertakings or parts of undertakings in a scheme area. Failing agreement, the terms of acquisition are to be those set out in a second appendix. An arbitration tribunal will be set up by the Lord Chancellor to determine the purchase price where not otherwise agreed and to settle other matters arising out of the purchase. The tribunal has also to approve an agreed purchase price (*paras.* 15 *and* 16).

Basis B.—The transfer of all existing undertakings and parts of undertakings in a scheme area to a "Distribution Authority," the latter to consist of from seven to twelve members appointed by the Minister of Transport after consultation with local authorities (including county councils) and organisations representing industry and agriculture in the area. It will be a body corporate, with power to borrow money and issue stock. This basis will be adopted where no satisfactory amalgamation is possible on Basis A.

Basis C.—The voluntary transfer of two or more municipal undertakings to a joint board, if the Electricity Commissioners are satisfied that this will effect improvement. A Special Order under Section 8 of the 1909 Act would be necessary. Small areas between the two undertakings or adjoining them may be brought into the scheme.

PARAS. 8 AND 9.—In order to avoid delay due to varying provisions in Acts and Orders relating to the undertakings consolidated, while these would be operated as one concern they would work under their individual supply powers until after the acquisition of a Special Order that would revoke duplicate and redundant powers.

What the Schemes Aim At

PARA. 10.—The general principles governing the preparation of schemes are:—

(a) A substantial reduction in the number of undertakings and the elimination of duplicate powers so that the area of supply of each unit should be large enough to embrace a reasonable diversity of demand (including both urban and rural areas) and to ensure that future technical developments can proceed on comprehensive and economic lines with adequate financial resources.

(b) The retention of the larger and more efficient undertakings as far as possible, *i.e.*, in accordance with Basis A.

(c) Where the undertaking to which other undertakings are to be transferred objects to the transfer, the Electricity Commissioners may set up a distribution authority.

In order to facilitate the formulation of voluntary schemes, the Commissioners may prepare a scheme on Basis B for any area at the request of the undertakings representing the majority of the kWh sold to consumers. Local authority undertakings to be acquired on Basis A will preferably be transferred to other public authority undertakings.

PARA. 11.—The Electricity Commissioners must satisfy themselves in respect of each scheme that it will (i) result in more efficient technical operation or in economies in capital expenditure or convenience of administration; (ii) lead to lower charges to consumers; and (iii) give a regular and efficient supply.

PARA. 12.—Average prices to consumers in the area of an acquired undertaking are not to be increased except with the approval of the Commissioners, who will take into account any special circumstances beyond the control of the consolidated undertaking.

PARA. 13.—Schemes proposed by the Commissioners will be published and may be altered as a result of representations made by undertakings and other interested bodies.

PARA. 14.—Schemes that have been agreed to by the undertakings concerned will become operative when made by the Electricity Commissioners. Otherwise the Commissioners' schemes will have to be confirmed by the Minister of Transport and approved by both Houses of Parliament.

PARA. 17.—The tenure of a company undertaking retained under a scheme shall not exceed fifty years, the exact period depending on the dates when any distribution undertakings owned by it would have become purchaseable by local authorities. The consolidated undertaking as a whole will be purchaseable, at the end of the prescribed tenure or at any interval of ten years thereafter, by an existing or new public body on the basis of capital expended less depreciation on a prescribed scale.

PARA. 18.—Existing purchase rights in respect of the consolidated area of any retained undertaking are to be rescinded.

PARA. 19.—Power and distribution companies are to be subjected during their consolidated tenure to control by a sliding scale relating prices to profits and in respect of the issue of new capital.

PARA. 20.—The sliding scale (which is set out in the third appendix) will provide for a standard rate of dividend on ordinary shares and prescribe the basis on which any surplus is allocated as between shareholders and consumers.

PARA. 21.—The approval of the Commissioners is required to the terms and form of the issue of new capital and to the terms of temporary borrowing between companies.

PARA. 22.—Authorised undertakers (whether in schemes or not) can be required to offer approved two-part or other appropriate tariffs for domestic and other supplies; to provide distribution mains of adequate capacity; to extend into undeveloped areas; and to offer facilities for assisted wiring and for the hire or hire-purchase of electrical apparatus. The right of an undertaking to require a guaranteed gross revenue of 20 per cent. on capital expended in giving new supplies may be modified.

PARA. 23.—Adjoining undertakings will be enabled or can be required by the Commissioners to enter into arrangements for mutual assistance as indicated in Section 19 of the 1919 Act, but permanently. Undertakings in districts may be required to put forward schemes for securing uniformity in the conditions of supply in their areas.

PARA. 24.—Such consolidation as is desirable in the relationship between holding and subsidiary companies, where these are authorised undertakings, will be effected by means of schemes.

Holding Companies

PARA. 25.—No arrangements between an authorised undertaking and a holding company or associated contracting company for the execution of works or the rendering of services shall continue in force or shall be entered into after the date of a scheme without the approval of the Commissioners.

PARA. 26.—Accounts of a holding company controlling authorised undertakings and any associated contracting or managing companies shall be open to inspection by auditors appointed by the Commissioners.

PARA. 27.—The staff employed in acquired undertakings will be transferred to the acquiring undertaking. Officers or servants who may be dispensed with or whose position is worsened will be compensated. Superannuation rights of those transferred will be preserved.

PARA. 28.—Provision will be made to ensure that the revenue to the Central Electricity Board will remain substantially the same as though undertakings had remained unamalgamated.

PARA. 29.—The basis of the reorganisation schemes will apply to Greater London, but only such variations as may be necessary to accord with the consolidation schemes will be made to the London Electricity (Nos. 1 and 2) Acts of 1925.

PARA. 30.—Other provisions to be included in the Bill relate to the compulsory publication of the actual scale of fixed charges under two-part tariffs, the power to attach cables to buildings and bridges (subject to appeal if the owners' consent is withheld), the prohibiting of an unauthorised undertaking from supplying new consumers in the area of a statutory distributor without the consent of the latter (subject to appeal to the Commissioners), and the compulsory acquisition (with the consent of the Commissioners) of the mains of an unauthorised undertaking on the basis of capital expenditure less depreciation. Local authorities are not to be entitled to restrict the right of anyone to take a supply of electricity. The holding of an inquiry by the Minister of Transport in

connection with the confirmation of Special Orders under the Schedule to the Act of 1919 will be permissive instead of mandatory.

Terms of Purchase

Appendix B of the memorandum sets out the terms of purchase of undertakings transferred or acquired compulsorily under schemes. The purchase price is to take account of four items: (i) The amount of capital expenditure attributed to the physical assets of the undertaking (less depreciation on a scale prepared by the Commissioners under Section 39 of the 1926 Act, which now awaits approval), together with hire-purchase balances due from consumers. (ii) The value of stocks and stores not included in (1). (iii) In the case of a local authority undertaking (including J.E.A.s and Joint Boards), the outstanding liability (if any) in respect of expenses (not included in (i)) properly being liquidated over a period of years. (iv) In the case of a company undertaking compensation for loss of profits for the unexpired period of the franchise, *i.e.*, the period up to the next date on which the undertaking becomes subject to a right of purchase; where allowance for goodwill is made in a purchase clause, the purchaser will have the option of purchasing on those terms with compensation for loss of profits during the period up to the purchase date.

The purchaser will take over consumers' deposits and any investments and cash balances of superannuation and other staff funds. The vendor will retain all other investments and cash balances, will have the right to collect amounts due up to the date of transfer, and will be responsible for liabilities outstanding on that date. Where the purchase price of local authorities' undertakings are less favourable than the sum necessary to discharge outstanding loans and liabilities, the terms of acquisition will provide the necessary sums to cover these items.

The Arbitration Tribunal will be empowered to make an appropriate reduction where the cost of works under (i) is shown to contain an unreasonable allowance for the services rendered by holding companies or their subsidiaries. For the purpose of compensation, future profits are to be calculated by the Tribunal on the basis of the return to be derived from the investment of the amount paid under (i) and (ii) in stocks or shares of a kind similar to those of the vendor company.

The net maintainable income will be the annual profits estimated to be earned by the physical assets taken over based upon the profits earned by these assets prior to the date of purchase less depreciation in accordance with the Commissioners' scale already referred to. The Tribunal is to be directed when assessing the net maintainable income to exclude net income from assets not taken over; to have regard to the suitability of the charges for maintenance in relation to the physical condition of the assets; to have regard to possible restrictions upon prices and dividends such as may be imposed by the projected Bill; and to make an appropriate allowance where the present return is less than a reasonable one and might be expected to increase.

The purchase price where the vendor is a local authority (or J.E.A. or Board) may be made at the vendor's option in cash or by the periodical payment to the vendor of sums equivalent to the interest and sinking fund charges on outstanding loans, any balance being paid in cash. A company vendor may receive cash or stocks and shares of the purchaser at a price determined by the Tribunal.

Purchase money received by local authorities will be employed to discharge outstanding loans and diabilities in respect of the undertaking and to reimburse the rates for any deficiencies made up from that source, any balance being employed for the benefit of consumers or for further electrical development in the area.

Prices and Profits

Appendix C gives the main outlines of a sliding scale relating prices to profits. It provides for the division of the surplus after meeting the following items: Working and establishment expenses and maintenance charges; depreciation under the before-mentioned schedule; contribution to a contingency or special purposes fund, not exceeding a quarter of one per cent. on the capital expenditure; interest on consumers' deposits; debenture and loan interest; preference dividends; and the standard rate of dividend on ordinary shares (see below).

Five-sixths of the surplus is to be transferred to an income suspense account, to be applied in reduction of charges or rebates to consumers, and one-sixth to a dividend suspense account to be available for distribution to ordinary shareholders.

The standard rate of dividend is to be determined by the Electricity Commissioners after consideration of: (1) The capital structure of the companies included in a scheme and the average level of profits earned by such undertakings during the three years prior to the "appointed day." (2) The changes in capital due to acquisitions under the Bill. (3) The existence of free reserves. (4) The operation of existing powers and powers to be imposed by the Bill for the control of retained companies in respect of the issue of capital and revision of maximum prices. It is provided that the sliding scale shall be subject to review at triennial intervals, and at other times if a change in circumstances has occurred, with the aim of bringing back the ordinary dividend to the standard rate after each triennial period.

British Standards and the Empire

THE principal theme of the speeches at the luncheon which followed the annual general meeting of the British Standards Institution, both held at the Dorchester Hotel on Tuesday of this week (June 8th), was the value of Empire unification in relation to standardisation.

Mr. E. J. Elford (retiring chairman of the B.S.I. and chairman of the Building Divisional Council) presided and, after the loyal toast, said it gave him particular pleasure to propose "The Visitors" because their guests included distinguished representatives of the Dominions. He thanked them for their co-operation in efforts that were being made to co-ordinate national standards. The B.S.I. learned a great deal from interchange of information with Empire countries, for they at home were often ignorant of conditions outside their own particular spheres. The relatively large sum which the Government contributed to the Institution's funds was an indication that its work was considered to be of value. Its significance was little appreciated and imperfectly understood by the general public, and Mr. Elford suggested that manufacturers should consider whether educational efforts could be undertaken.

The Hon. R. G. Casey (treasurer, Commonwealth of Australia), remarked in reply that he was an engineer before a politician and therefore could assure his hosts of his great appreciation of the standardisation work being done both at home and in Australia, where there was a kindred association. As Commonwealth Treasurer he had been glad to be able to advise steadily increasing financial aid. They relied largely on home specifications, modified to suit local conditions. That arrangement was typically British, largely voluntary and without compulsion; it was a method of getting things done without bitterness or ill-feeling. The Australian organisation was bound to increase in importance as secondary industries were developed. Accordingly, it would have to lean more and more on the home organisation, at the same time increasing its own activities. The overseas tour of Mr. C. le Maistre (director, B.S.I.) had been greatly appreciated because considerable importance was attached to personal contact between the home country and Australia.

The Hon. W. Nash (Minister of Finance, Dominion of New Zealand), also remarked on how very helpful Mr. le Maistre's personal visit had been with regard to procedure and objectives. They had chosen a slightly different path, as standardisation in New Zealand was almost entirely associated with the Government, but they had the help of those outside and they appreciated the debt they owed to the British organisation, which had done all it could to assist them along the road they had wished to travel. The New Zealand Government was now purchasing from the farmers butter, cheese, &c., according to specification. Prices were fixed on that basis and between £18 and £20 million was being spent yearly in that way. The old attitude that the "purchaser must beware" must be changed. Standardisation was bringing trust, for the buyer knew that the goods he wished to purchase would be up to standard, since their contents were known before they were offered for sale.

Sir Edward Crowe (Comptroller-General, Department of Overseas Trade), in proposing the toast of "The B.S.I.," said that the public's unfamiliarity with standards did not surprise him. How could the public in general be expected to realise what standardisation meant when advertising methods created the reverse impression. Standardisation was a boon to manufacturers and the B.S.I. was doing much to help trade both at home and overseas. The establishment of a local committee in South America was particularly appreciated. The D.O.T. was specially interested in the B.S.I. because it was helping to maintain the prestige of British goods, thus assisting overseas trade.

Dr. E. F. Armstrong (the new chairman of the B.S.I. and the Chemical Divisional Council), in responding, mentioned that the Institution's work last year involved the holding of 1,000 committee meetings. A greater gain than the production of specifications was the personal contact that was established between members of committees and the various industries concerned. The British Standards Institution was broadening both its activities and the avenues along which it hoped to travel in future.

Special Television Cable

Rigorous requirements satisfied by ingenious design

FOR the first time permanently installed underground cables of appreciable length were utilised for the direct televising of Coronation procession street scenes. For that and possible future occasions, broadcast viewing of scenes from theatres, &c., nine "Emitron" camera plug sockets have been provided in Park Lane, at Hyde Park Corner, Piccadilly Circus, Whitehall (two), Westminster, St. James' and Buckingham Palaces, and Victoria railway station.

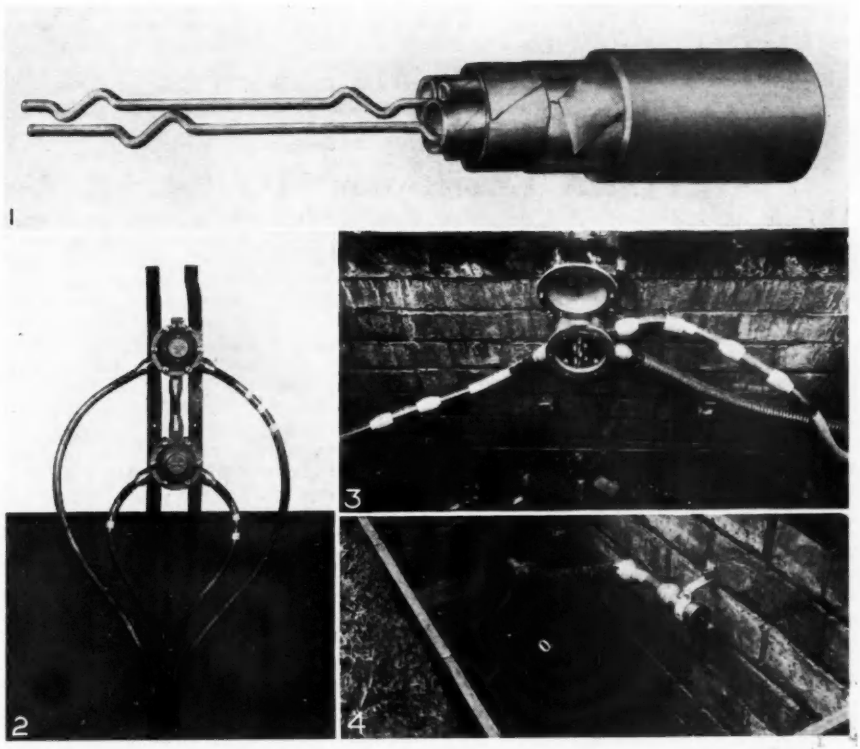
The cable route, in two sections, is from the B.B.C. transmitter to Broadcasting House (7.25 miles), thence westward along Oxford Street, down Park Lane, Piccadilly, Shaftesbury Avenue and St. Martin's Lane to the Whitehall telephone exchange (4.33 miles), where it forks down Whitehall to Westminster (0.80 mile) and along Pall Mall to Buckingham Palace and Victoria station (1.79 miles), making a total length of 14.17 miles.

The cable is of the balanced twin type, containing two self-locating conductors of 0.08 in. diameter, paper-insulated and sheathed to a diameter of 0.91 in. with a ternary lead alloy. It has been made (and laid for the Post Office, for the use of the B.B.C.) by Siemens Brothers & Co., Ltd., in co-operation with Electrical & Musical Industries, Ltd., whose research organisation has successfully overcome the associated difficulties of network equalisation and extra-wide-band amplification, thus making this type of cable suitable for high-definition transmission of vision signals in repeater sections of up to eight miles in length.

So far as underground cable technique is concerned, there is a strong resemblence between the conveyance of vision signals and concurrently developed carrier telephony. In both cases the aim is to transmit a wide band of frequencies, but the best means of doing so are not necessarily the same in the two cases, the method being closely inter-related with the design of the cable and its associated equipment.

Liability to external interference and mutual action between "go" and "return" circuits prohibits the employment of co-axial cables for frequencies below 60 kc. per sec. For telephony this limitation is immaterial, since a band width of from 300 to 2,600 cycles per sec. suffices. For music, a range from 50 to 10,000 cycles per sec. is adequate, but for television the requirements are far more rigorous; all frequencies from zero up to 2.5 Mc. per sec. must be propagated with equal velocity and attenuation, without distortion, and free from external disturbance and internal reflections.

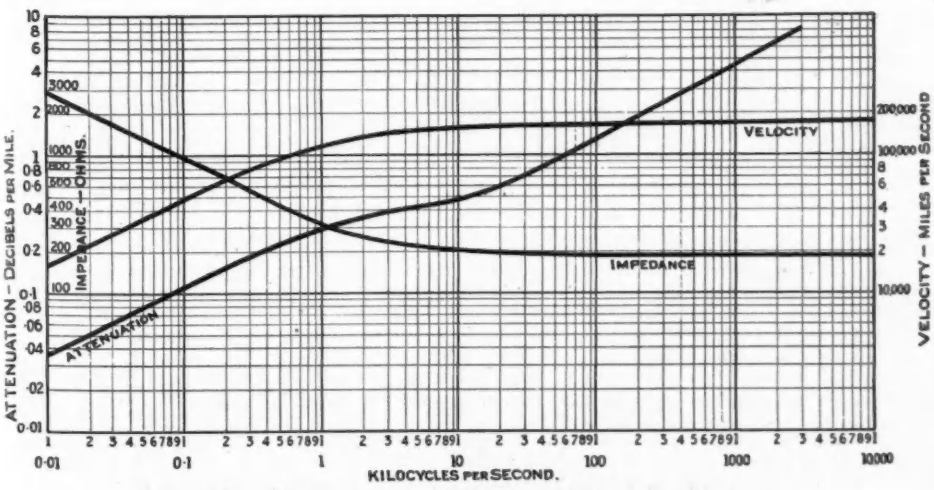
The twin and star-quad constructions, being symmetrical, are both free from external interference. The star-quad form, when used as a phantom, is the more immune, while the twin causes considerably less attenuation. It is very necessary for both types to have a dielectric of low specific inductive capacity and small loss at frequencies of the order of two million cycles per sec. Air is ideal in this respect, and in order to include as much air as possible in the space between the conductors insulating separators are employed. These may either be solid discs spaced at intervals, or flexible spiral cords and tapes wrapped round the inner core of the co-axial or round each of the two conductors of the twin.



1. Construction of the cable. 2. Link boxes at the Whitehall Exchange. 3. Watertight link tee box for camera branch, with access lid open. 4. Watertight socket at Apsley House for receiving mobile control van plug

The E.M.I.-Siemens high-frequency cable has a conductor specially formed in such a way that it locates itself centrally within a tube of insulating material. This is effected by crimping the conductor to a form corresponding approximately to a complete sine wave, the successive crimps lying in planes at right-angles to each other. The insulating tube may consist of paper or some such thermo-plastic material as gutta-percha. The co-axial tube is surrounded by the metallic return conductor, while twin tubes each containing one crimped core are twisted together and a copper screening tape laid round them. When a paper insulating tube is used the cable is dried and sheathed with lead in the same way as an ordinary telephone cable.

The h.f. television cables have been drawn into P.O. ducts already nearly filled to capacity with local underground telephone cables. As so little space was available, more than ordinary care was needed to avoid distorting the



Transmission characteristics of twin cable (self-locating conductors)

h.f. cable with consequent adverse effects on its electrical characteristics. Specially devised ball bearing swivels, cable grips and such like appliances had to be provided owing to the small space available, equivalent to a bore of one inch only.

The cable is protected in the jointing chambers in some cases by flexible tubing and in others by lengths of channel iron troughing. The joints are made solid at intervals of 250 yd. by means of a wax that has small dielectric losses. This precaution will localise the effects of accidental ingress of moisture, which, if not restricted in this manner, might otherwise creep a considerable distance along a cable containing so large a volume of air space.

The "Emitron" camera connection is made by means of a flexible cable of special make-up. It contains two co-axial cores, each consisting of a crimped conductor as before described but enclosed for pliability within a gutta-percha tube and surrounded by a double braiding of copper wires. These form the vision circuits, while other conductors (insulated with rubber in the normal manner) carry the filament and anode currents to the camera, also providing telephone facilities between the operators and the control room. These auxiliary cores are twisted together and screened where necessary to prevent mutual interference. The whole flexible cable is covered with layers of waterproof rubber tape, enclosing a further screen of copper braids, and an outer serving of hemp provides protection against wear and tear. This type of "flex" enables the camera to be manœuvred within a radius of 1,000 ft. of the mobile control van which, in turn, can be plugged into any one of the nine tapping sockets at the viewing points established along the underground h.f. cable route.

The control vehicle (purchased sometime ago by the B.B.C. from the Marconi-E.M.I. Co.) is mounted on an A.E.C. chassis. It weighs 8.5 tons and contains the vision control apparatus in addition to the associated faders and amplifiers for the accompanying sound microphones. A similar motor van is equipped as a mobile ultra-short-wave radio transmitter and can be used as a radio link alternative to the underground h.f. cable.

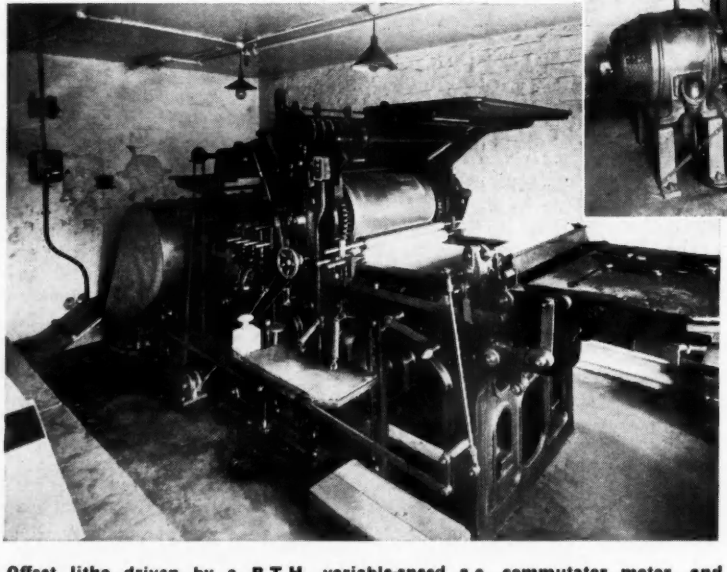
Provision for the extension of this cable eastward is already being made.

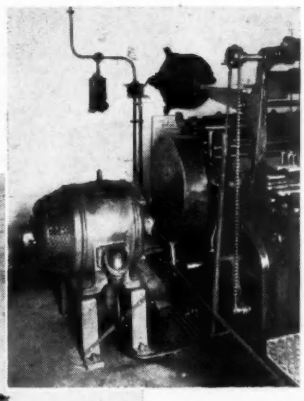
A Change-over in a Printing Works

WHEN the printing works of the *Ashton Reporter* were electrified in 1926 a 50-h.p. variable-speed a.c. motor was used for driving the rotary news press, but most of the other machines were driven by d.c. motors because no small variable-speed a.c. motors had then been developed suitable for the individual drive of small presses, &c.

In due course the Ashton-under-Lyne Corporation insisted that further extensions of the plant should operate on a.c., with the result that when it was finally decided to make a complete change-over from d.c. to a.c. it was found that the cabling was in such a complicated state that complete rewiring was necessary. Following a report by B.T.H. engineers the company was instructed to proceed with the work of reorganisation and to supply the whole of the electrical equipment for the conversion.

Separate feeders have been run into each department so that single-phase or three-phase motors can be used. In addition, as the power and industrial heating rates are the same, arrangements were made for the electrical heating of the presses without having to run separate cables, by taking three-phase and neutral distribution cables into each department where either one or two iron-clad distribution boards were installed. These distribution cables are all controlled from the main iron-clad switchboard on the ground floor. The arrangement of the incoming cables and meters deserves special notice. Instead of the supply authorities' usual arrangement of meter-board and link-boxes connected by loose v.i.r. cable, the three single-phase power and three single-phase lighting meters are mounted in a box directly above the main incoming oil circuit-breaker.





Offset litho driven by a B.T.H. variable-speed a.c. commutator motor, and (right) the d.c. motor drive which it replaced

When replacing the motors it was found necessary in certain instances, particularly with variable-speed machines, to rearrange the drive in order to accommodate a large a.c. motor without taking up useful floor space. The accompanying illustrations demonstrate how this has been achieved. Space occupied by the d.c. motor has been saved by placing the new a.c. motor beneath the machine, a vee-rope being employed instead of a spur gear. This method could not be employed originally owing to the greater diameter of the d.c. motor and because vee-rope drives were not then generally applied. The new drive permits the operator to start, stop, inch and control the speed of his machine from the platform, whereas with the d.c. equipment it was necessary, in order to vary the speed, to operate the field rheostat fixed on the wall.

Two of a group of platens which have all been rearranged, were originally driven through a short length of line-shaft by a single d.c. motor, but now each has a separate motor. Two Heidelberg machines were originally driven by a variable-speed d.c. motor having a speed range of 1,000 to 2,000 r.p.m. A shunt characteristic is essential, as the load can be varied considerably at any speed and, furthermore, as a clutch and flywheel are employed, it is necessary that there should be very small speed variation between no-load and full-load. The d.c. motor was, therefore, replaced by the installation on each machine of a 3/1 h.p., 1,830/610 r.p.m. variable-speed motor, with separate regulator and a push-button starter.

The folding machine is driven by a single-phase repulsion motor rated at 0.75/0.25 h.p. at 1,500/500 r.p.m. and controlled by a contactor starter. Although this motor has a series characteristic and the folder it is driving has a constant torque characteristic, the drive is quite satisfactory as the load does not vary under any operating conditions. A lever projecting from the machine near the bottom left-hand corner of the starter is used to control the speed of the motor by movement of the brush position.

A bill-printing machine is driven by a 4/1 h.p., 1,200/300 r.p.m., variable-speed standard a.c. motor. A new pinion and spur wheel have been fitted to the press to get the low speed required and this arrangement has proved less expensive than winding a new motor specially for the duty. Variable-speed motors are also used to drive a line of Miehle presses, are each rated at 4/1.3 h.p. at 1,360/450 r.p.m., and equipped with mechanical remote hand-control to obtain the necessary speed variation from the operator's platform. They are controlled by contactor starters having "start," "stop," and "inch" control, electrically interlocked with the motor brushgear. In the change-over vee-rope drives were installed on some of these presses in place of the flat belt and jockey pulley originally used.

Two "Intertype" machines are each driven by a ½ h.p., 950 r.p.m. squirrel-cage motor controlled by a direct-on line starter, and a metal saw and router in the stereo foundry are driven by a ½ h.p., 1,450 r.p.m. squirrel-cage motor with a similar starter. Altogether, there are thirty-seven B.T.H. motors and control equipments varying from 50 to ¼ h.p.

Electricity on the Dairy Farm

A survey of electrical equipment for milk and butter handling

NOW that the season of agricultural shows is in full swing it is opportune to review the electrically driven equipment which is now available for dairy farms. The expansion of distribution systems and a steady reduction in tariffs during the past few years has opened up the possibilities of the use of electricity in rural and semi-rural areas.

In dairies and dairy farms the scope for electricity is particularly marked for only one-third of the milk produced in this country comes up to the "Accredited" Grade for which the Milk Board offers an extra 1d. per gallon. For this grade a very high standard of cleanliness on the farm is demanded, which can easily be secured by the use of electrical equipment. Electric milkers eliminate the use of the hands, clippers avoid dirt in the milk, refrigerators keep the bacteria content low, and sterilisers ensure clean utensils; above all, good lighting of the farm sheds is imperative.

A G.E.C. - Barford sterilising chest

The running charge for electricity varies throughout the country, and although 2d. per kWh is considered to be an economical rate, in several rural areas only ¾d. per kWh is charged. With 25 cows yielding 600 gallons of milk per year the extra 1d. per gallon means an increase of £62 over the year, which is enough to make electrification worth while. Electric lighting of the milking sheds ensures clean milk and more rapid milking—about 3-ft.-candles would suffice. The Agricultural Engineering Department of Wisconsin University has calculated that where stabling and cleaning takes 14 minutes by oil lighting, only 10 minutes is needed if electric lighting is used.

A saving of 30 per cent. or more is sometimes possible through the introduction of electric milking machines of which there are estimated to be 20,000 in use in this country. Electric power eliminates the difficult starting of i.c. engines and frozen water jackets in winter, together with the risk of the milk absorbing fumes. The size of the motor necessary ranges from ½ to 3 h.p., the consumption of electricity varying between ½ and ¾-kWh per cow per week.

There are many such machines on the market, one of the best known being Gascoigne's. The pumps, which are of the rotary type, are mounted with a motor on a cast-iron plate and driven through a V-belt. A new design by the Alfa-Laval Co., Ltd., is the type C-8, a complete plant of compact layout comprising two pulsator units, pail, sanitary trap vacuum controller, vacuum gauge and a ½-h.p. motor direct-coupled to a rotary pump mounted on a common cast-iron frame. The company's pulsator machines can also be supplied with electric drive.

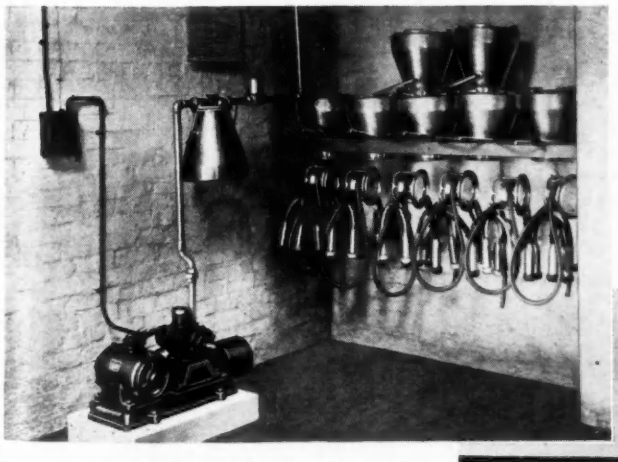
An electrically driven churn by R. A. Lister, Ltd.

The "McCormick-Deering" milking machine of the International Harvester Co., of Great Britain, Ltd., also employs electric drive, either a ¾-h.p. motor driving a single cylinder reciprocating pump or a 1-h.p. motor driving a two-cylinder pump. Another electrically operated milker is sold by the Manus Milking Machine Depôt.

Apart from standard electric sterilising chests, Boucher-Giles & Co., Ltd., make a special steriliser for milking machines. It holds five pints of water which is heated by a 1½-kW element incorporating a safety cut-out which comes into use should the steriliser boil dry.

Milk leaves the cow at a temperature of about 98 deg. F., which is in the region of the optimum temperature of bacteria, and to prevent subsequent "turning" it must be cooled immediately. With water cooling, the temperature obtained is only 60 to 65 deg. F., whereas for safe storage it must be reduced to 40 to 45 deg. It is here that electrical milk coolers come into their own. Not only for releasing animal heat, but also for pasteurisation where cooling from 150 deg. to 40 deg. as rapidly as possible is effected, are they essential. Temperature also plays a vital part in butter production. Sweet cream butter has to be cooled to 45 deg. and held at this temperature for several hours; ripened cream butter is cooled to 65 deg. after pasteurisation and subsequently to 40 deg., while for storage of butter and cheese 35 deg. is usual. In this case humidity control to prevent mould growth becomes an important factor. By the use of electrical refrigeration equipment a fine accuracy of control is ensured by simple means, and about 40 gallons of milk can be cooled for 1 kWh of electricity.

For milk cooling it is usual for the milk to run over the outside of a "radiator" filled with circulating refrigerant. Generally the milk is cooled to about 60 deg. by water in the top half of the cooler and to 40 deg. by refrigeration in the bottom half. It is then either bottled direct or placed in the hold-over store and kept at just above freezing point. Two models of this type are made by L. Stern & Co., Ltd., the direct expansion model



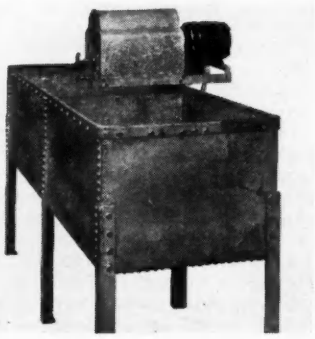
Left: A "Gascoigne" electric milker fitted with a Metro-Vick motor and (below)

The milk cooling equipment (L. Sterne & Co.) and cream separator at Auchineden Farm, Blanefield

being available in sizes from 20 gallons upward. Greater efficiency is obtained from the brine circulation system because as milk cooling duty is normally heavy for short periods only, a large reserve of cold brine is maintained ready for service as required, enabling a smaller compressor to be used. The brine can also be used to chill a cold storage chamber, while automatic temperature control can be employed. Here, again, water is used for the top coils. Other specialists in this type of equipment are J. & E. Hall, Ltd., whose smallest model will cool 30 gall. of milk per hr. and the Dairy Outfit Co., Ltd., which makes two sizes—25 gall. (¾-h.p. motor) and 45 gall. (1½ h.p.).

A combined milk cooler and cold storage plant of the air-cooled type using methyl chloride as a refrigerant, as well as direct-expansion plant, are made by the Pulsometer Engineering Co., Ltd.; the smallest size (¾ h.p.) will hold two 12-gallon churns. Direct expansion units rated at from 20 to 60 gallons per hour and automatic plant with cold storage are sold by J. Nathan & Co., Ltd. "Desco" ethyl-chloride plant is a product of the Dairy Supply Co., various sizes being available with or without cold rooms. Cooling equipment is also marketed by the Cherry-Burrell Cpn., Perfect Dairy Machines, Ltd. (using carbon dioxide or ammonia), York Shipley, Ltd., Frigidaire, Ltd. (who make up all sizes of unit), the Lightfoot Refrigeration Co., Ltd., and Perkins Clean Milk Equipment, Ltd.

Under the "Accredited Producers" scheme steam sterilising of utensils is almost essential and many makers are producing electrical equipment for this purpose, thus obviating the necessity of an extra room to house the boiler and coal, &c. These chests, which have built-in heating elements without external pipes or steam connections, are made in sizes ranging from 12 to 75 cu. ft.



The Cockx "Paragon" bottle washer fitted with a wash-up trough

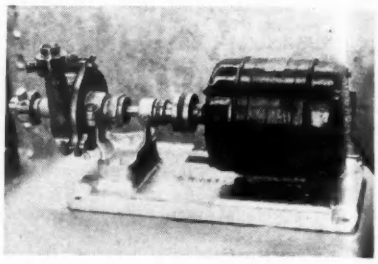
Specialists in sterilising equipment are the General Electric Co., Ltd., in conjunction with Aveling-Barford, Ltd., who besides special models, make four standard sterilising chests of 12, 27, 48 and 75 cu. ft., loaded at 4, 6, 8 and 12 kW respectively. For larger farms these companies produce a steam-raising boiler with a capacity of 20 gallons heated by a 5-kW element. The working pressure is 15 lb. per sq. in., evaporating 55 to 60 lb. of water an hour. For water heating 15 gall. can be raised to 180 deg. F. in 22 minutes. Thermostatic control is recommended. Boucher-Giles & Co., Ltd., have produced a 27 cu. ft. sterilising outfit loaded at 7½ kW. A continual supply of hot water at a temperature of 115 deg. can be drawn from the boiler at the rate of 30 gallons per hour.

A new range of electric sterilisers has been introduced by Martin's Cultivator Co., Ltd.; the specially shaped boiler is fitted with an inspection cover and four models are available with capacities of 27, 36, 48 and 65 cu. ft. with loadings of 7, 9, 10 and 15 kW. Both boilers and chests are made by Perkins Clean Milk Equipment, Ltd., a new "Power" boiler having a capacity of 15 gallons. It is fitted with three 5-kW elements and gives a working pressure of 30 lb. per sq. in. which can be raised in 20 min. The door of the sterilising chest is now made of pressed steel and is designed to make a steam-tight joint with the cabinet and provision is made for drying off utensils. Sizes vary from 18 to 75 cu. ft. with loadings of from 6 to 15 kW.

A large proportion of the milk supplied these days undergoes pasteurisation treatment, and a wide range of electrical equipment can be obtained for this purpose; whether the "holder" or "flash" processes are used, rapid cooling is necessary. Destruction of nearly all the bacteria is ensured in either case. A 50-gallon "Precision" pasteuriser in stainless steel is made by Perkins Clean Milk Equipment, Ltd. The agitator takes the form of a motor-driven propeller and various sizes rated at from 15 to 100 gall. are obtainable. The batch retarding pasteuriser—sold by the Dairy Outfit Co., Ltd., is fitted with thermostatic control. Although heating is by steam an electric motor is employed to drive the agitator.

For large scale pasteurisation G. S. Clayton, Ltd., make "Cloverleaf" retarders capable of dealing with from 100 gall. to 1,000 gall. per hour. Another maker of pasteurisers is Aveling-Barford, Ltd., whose steam heated "Econom" model is fitted with an electric agitator. A 60-gall. pasteuriser by the Cherry-Burrell Corporation carries out in one unit precooling, storing, heating, holding, cooling, bottling, and capping, while the "Desco" (Dairy Supply Co.) pasteuriser is suitable for heating and holding in one compartment from 20 to 150 gall. of milk.

The value of a reliable water-pumping system on dairy farms cannot be overestimated for 10 to 15 gall. of cool pure water is required per day per cow for drinking only and for all purposes 20-25 gall. is necessary. The water from a deep well pump is usually best and even with a suction lift of 20 ft. with a delivery lift of 64 ft. 115 gall. can be obtained for less than 2 kWh with a high-speed piston, while under less arduous conditions as much as 500 gall. per kWh may be obtained.

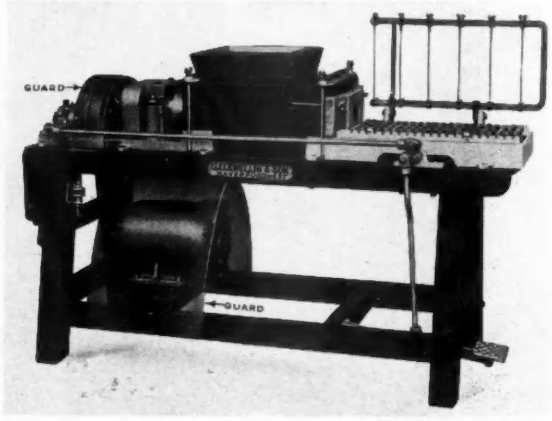


Perkins "Precision" milk pump

Manufacturers of suitable pumps include the Pulsometer Engineering Co., Ltd., G. Hopkins & Sons, Ltd., R. A. Lister, Ltd., James Beresford & Son, Ltd., Marelli Co., Ltd., G. Gilkes & Gordon, Ltd., Godwin, Ltd., Pump Unit, Ltd., Rotoplunge Pump Co., Thomas & Sons, Ltd., and G. & J. Weir, Ltd.

Electric milk pumps will deliver 1,000 gall. of milk with a suction of from 8 to 20 ft. and delivery of 20 to 64 ft. with a consumption of from 0.66 kWh to 1.9 kWh. Perkins "Precision" pumps have a capacity of 250 gall. per hour delivering to a height of 20 ft. with no suction lift; they are driven by a ½-h.p. motor. Three sizes of "Gem" milk pumps are made by the Graham-Enock Manufacturing Co., Ltd., with 1, 1½ or 2-in. bore, and capable of dealing with from 100 to 4,500 gall. per hr.

Bottling is carried out on many farms and small electrically driven bottle washers are made for this purpose, washing 1,000 bottles for one kWh of electricity. The new "Speedy" machine of Cockx & Sons will fill and disc 1,340 small bottles or 900 quart bottles per hour. The motor-driven bottle filler and capper of Perfect Dairy Machines Ltd., is available with six, ten or fourteen valves. Motor drive is also applicable to the rotary milk bottle fillers and cappers of the Dairy Outfit Co., Ltd. Both small- and large-size machines are made by the Graham-Enock Mfg. Co., Ltd., of particular interest on the farm being the "Little Gem" capable of filling 18 bottles a minute, while the "Swift" fillers and cappers of G. S. Clayton can also be adapted to electric drive. Another maker of this type of equipment is Auto Davies, Ltd.



The Llewellin electric butter moulder

Small bottle washers, known as the "Perfection Duo," are made by Perkins Clean Milk Equipment, Ltd. Washing two at a time, they will clean thirty bottles a minute and are driven by a ½-h.p. motor. A large-size model designed to wash and sterilise 2,000 bottles an hour is driven by a ¾-h.p. motor. The "Paragon" electric washer of Cockx & Sons will take bottles of all sizes. The "Perfect" bottle-cleaning machine has also a compartment for soaking bottles. A small electrically driven washer known as the "Defiance" (Nathan's Sales, Ltd.) is direct coupled to the motor and washes two bottles at a time, while a small machine designed to fit across any washing trough is also supplied by the Dairy Outfit Co. It is known

as the "Vari-brush," as the size of the brush can be varied for different size bottles. The "Multi-brush" is a large model. Bottle-washing machines of all types from small single-brush machines up to the "O" slow-speed multiple-brush machine with brushes adjustable to take from ½- to 2-pint bottles are made by Aveling-Barford, Ltd.

An important adjunct to sterilisation to ensure clean milk is the clipping of cows. For this purpose the Cooper-Stewart Engineering Co., Ltd., has introduced the "Clipmaster" clipper for cattle and horses. It is rated at 40/50 W and weighs less than 4 lb. The "Stockman" is a larger pedestal machine fitted with a ¼-h.p. motor. Clipping machines of both the stand and pendant types are made by the Wolseley Sheep-Shearing Machine Co., Ltd., and by R. A. Lister & Co.

Motor-driven cream separators are a product of the Alfa-Laval Company and R. A. Lister, Ltd. "Westfalia" models are sold by the Dairy Outfit Co., Ltd., and the "Clock" separator is a product of the Dairy Supply Co., Ltd.

For butter making churning can be carried out very successfully electrically with a consumption of about 1 kWh for 100 lb. of butter, although the size of the motors employed may vary from ¼ to 3 h.p., while for cheese curd grinding 6 cwt. may be treated for 1 kWh. Butter-making machinery, including electrically driven churns, with self-contained geared motors built-in, and blending tables fitted with 12-h.p. motors, is supplied by G. Llewellin & Son, who also make electrical moulders and weighers. Self-contained electrically driven churns are made by R. A. Lister & Co.

Correspondence

Contributions from readers are welcomed. The writer should give his name and address, not necessarily for publication

Checking Two-part Tariff Meters

With reference to Mr. Bailey's remarks in your issue dated June 4th I have found the system of checking rentals which I wrote about last week absolutely satisfactory in every way. If there are two-part tariff prepayment meters which give no indication when the switch opens, then I think that that type does not give all the information that is so useful to the consumer and slot collector. Also, all prepayment meter coins-inserted dials must return to zero when the switch opens, which gives the information required automatically.

I cannot see any difficulty if all the switches in a batch of meters open simultaneously. Of course, I took it for granted that all meter engineers knew the reason why the meters would not start when the condenser was short-circuited by the prepayment switch. With regard to using synchronous clocks for each individual meter, I am afraid that this would prove too costly and laborious for, say, a batch of fifty meters.

London, S.W.1, *June 4th*. S. HUNT.

Rotating Vectors

Mr. Stubbings's article on the use of vectors in a.c. work in your issue of May 21st suggests that the adoption of this notation for the representation of electrical quantities was much more haphazard than is actually the case.

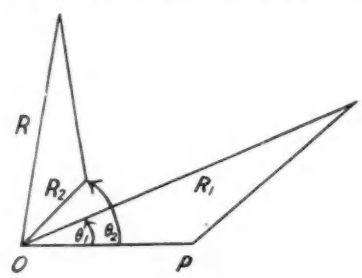


Fig. 1

The initial definition is of course that $x+jy$ is a vector of components (x, y) where y is measured in a direction perpendicular to that in which x is measured. But it is putting the cart before the horse to say that the convention with regard to the multiplication of vectors will work if we put j^2 equal to -1. The fact is that we adopt the convention and the equation follows. It follows also from this fact that multiplying a vector by j turns it through an angle of $+\pi/_2$.

First of all, however, it must not be thought that this convention has been adopted without some justification. Suppose, for example, we require to find a reasonable interpretation of the product of two vectors R_1, R_2 (see fig. 1).

If we take a point P on the axis so that OP is of unit length and complete the triangle formed by OP and R_1 we can construct a similar triangle on R_2. If in this second triangle R_2 corresponds to OP and R corresponds to R_1, then $R/R_2=R_1/OP=R_1$, therefore $R_1R_2=R$.

Now the angle between R and OP is $(\theta_1+\theta_2)$, and so it is very reasonable to define the product of two vectors R_1, R_2 as a vector R, whose magnitude is R_1 R_2 and whose direction makes an angle $(\theta_1+\theta_2)$ with the direction of the x axis.

Incidentally, it might be thought that another vector R^1, say, would fulfil the required conditions where the angle between R^1 and the x axis is $(\theta_2-\theta_1)$, since two triangles can be constructed on R_2 similar to that produced by OP and R_1. This ambiguity is, however, removed if we stipulate that the corresponding angles in the two similar triangles are to be of the same sign.

Now let the co-ordinates determining R_1 be (x_1, y_1), *i.e.*, let $R_1=x_1+jy_1$ and let $R_2=x_2+jy_2$. Then our definition of multiplication gives us:—$R=R_1R_2 \cos(\theta_1+\theta_2)+jR_1R_2 \sin(\theta_1+\theta_2)$, which can be shown to be $x_1x_2-y_1y_2+i\{x_1y_2+x_2y_1\}$.

Now suppose $x_1=0=x_2$ and $y_1=1=y_2$, $R_1=0+j$ and R_2. The product of R_1 and R_2 is equal to j^2, *i.e.*, $j^2=R=0-1+0=1$.

It now follows that $j(x+jy)=-y+jx$, so that multiplying a vector by j turns it through an angle of $+\pi/_2$.

Cambridge, *June 3rd*. C. J. CARTER.

Leakage-trip Protection

Mr. T. C. Gilbert seems unfair to the author of the above article whose reasoning is certainly not confused. The article described protective apparatus and the proper precautions to be taken when installing it in order to ensure safety from shock. In addition, it was shown that the apparatus complied with Regulation 1,005 C which is intended to prevent risk from shock, but owing to the confused reasoning in the wording of that Regulation considerable practical understanding of operating conditions is necessary to make it effective.

Regulation 1,005 C requires, under certain conditions, earthing to be supplemented by an earth-leakage trip adjusted to operate at not more than 30 mA. Obviously, this is generally understood to mean parallel earth paths, the main earth shunting the trip coil. The Regulation states nothing about the earth electrodes, how far apart they must be placed in wet soil or dry, nor is anything stated about the precautions which are necessary to prevent risk of the trip coil being shunted by uninsulated earth wires. The only definite requirement is that the coil shall be energised with not more than 30 mA.

The writer of the article quite rightly pointed out the precautions an electrician must take when installing a protective switch, *viz.*, to keep the trip-coil electrode at least 6 ft. away from the main earth electrode and insulate the trip coil lead.

Regulation 1,005 C would have been much more useful if it had had a direct bearing on Regulation 1,001 B, which requires earthing only when the supply voltage exceeds 30 V a.c. or 115 V d.c., the latter being assumed to be a safe voltage. If the supply voltage exceeds these values then protective apparatus is efficient when it prevents any kind of fault producing more than 30 V a.c., or 115 V d.c., between the frame of apparatus and earth. The Regulation should simply state the requirements to be met and leave the apparatus makers and inventors a free hand with the equipment. A. G. BULLEN.

Liverpool, 8, *June 4th*.

In reply to the first paragraphs of Mr. T. C. Gilbert's letter in your issue of June 4th, the reason that I "understand" that the Home Office recommends the double system of earthing referred to in my article is because I have been repeatedly informed that this is the case by the Home Office. I do not know of any better authority.

Dealing with Mr. Gilbert's second difficulty, I refer him to fig. 2 of my article. An inspection of this will show that if the earth wire from the earth electrode E.3 to the trip coil makes contact with the other earth wire or the motor case, or anything electrically connected thereto, the trip coil will be short-circuited and inoperative. Exactly the same principle applies when a leakage trip with only a single earth connection is used. If the earth wire from the earth electrode to the trip coil makes contact with the apparatus to be protected or with anything electrical connected to it, the trip coil is short-circuited and inoperative. This is an important point, but one frequently overlooked.

It is always safer to use an insulated wire for this connection unless it is quite obvious from inspection of the site that there is no possibility of the wire ever making accidental contact with another part of the earthing system.

June 7th. THE WRITER OF THE ARTICLE.

New Apparatus and Devices

for Domestic, Cooking and Heating, Lighting, Power and Scientific Purposes

Delay Fuses for Radio

The purpose of the "Mag-nickel" fuses that have been developed by BELLING & LEE, LTD., Enfield, Middlesex, is to provide protection to radio receivers against small continuous overloads (such as may be due to a fault in one secondary winding of a mains transformer) and at the same time to avoid interruptions of supply due to the surge at switching on.

Small blobs of magnesium with a flash point of 650 deg. C. are mounted in a suitable binder on the robust nickel filament which melts at 1,500 deg. C. and an overload of appreciable duration will heat the magnesium enough to cause it to fire and melt the nickel. Three ratings are available, 0.25 A, 0.5 A, and 0.75 A. A ½-A "Mag-nickel" fuse is designed to resist the same surges as a 1-A conventional radio fuse but to blow on a 75 per cent. overload persisting for 1 sec.

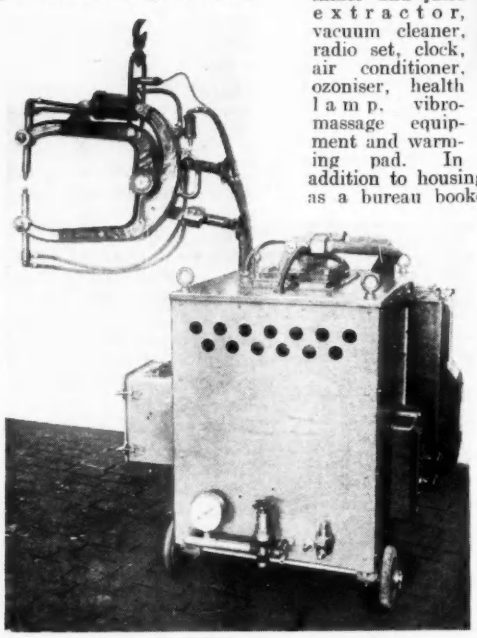
Dimensions are the same as for standard radio fuses, *i.e.*, 1¼ in. by ¼ in. and cylindrical end caps and glass tubes are fitted, so that they fit standard fuseholders. They are colour coded with rings indicating the same nominal ratings as standard fuses.

A New Welder

A suspended spot welder of the pincer type for motor car work is the latest development by BRITISH INSULATED CABLES, LTD., Prescot, Lancs. The transformer is of standard design, rated at 35 kVA and mounted in a light steel case on rubber-tyred wheels.

The transformer may be mounted above on a suitable gantry, this arrangement giving a clear floor space for the car bodies which are being welded. The usual plug box and main switch are provided, and, in addition, there is a thyratron control.

The air and water control valves are so arranged that the external connections are brought to the case. The welding heads are of various designs to suit different applications. The one shown in the illustration is arranged with a fair-sized gap between the electrodes to enable a weld to be made on various projections. Other types of head can be supplied to suit particular classes of work, *e.g.*, a pencil type, where one electrode is bolted to a special copper block inserted in any place inaccessible to the ordinary pincer-type head, while the other is applied to the outside of the work.



The B.I. suspended spot welder

An Audio-frequency Level Meter

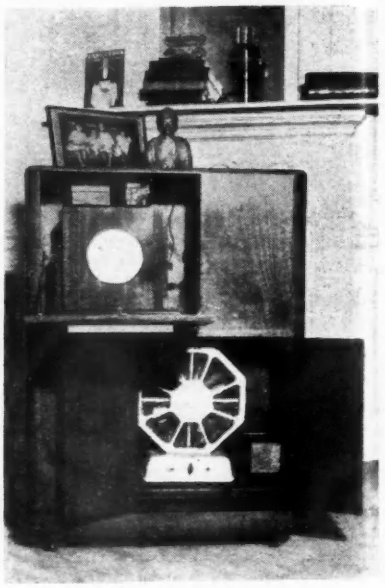
In telephone repeater stations the indication of power level (voltage) in a circuit is usually performed by means of a direct - reading attenuation measuring set. But many measurements in the audio-frequency range instrument of less precision is satisfactory, and the GENERAL ELECTRIC CO., LTD., Magnet House, Kingsway, London, W.C.2, has recently developed a portable level meter that is direct reading and is no more difficult to use than an ordinary voltmeter. It can be used not only for measuring telephone line attenuation and repeater gain, but also by broadcasting organisations, radio manufacturers and gramophone recording companies. It can be operated either from a.c. mains or from batteries.

This "Salford" instrument consists of a thermionic amplifier feeding a log-scale moving-coil voltmeter of the rectifier type. Facilities are provided for maintaining the amplifier gain at the required value and for setting the output of an associated oscillator to any level between +20 and −35 db on 1 mW in 600 ohms. By means of a key, this level can be readily applied to any external circuit, the input of the level measuring circuit being simultaneously switched to a jack plug, from which leads may be taken to other points in the circuit under test. The range is 100 to 12,000 cycles per second. The accuracy over the range 400 to 12,000 cycles per second is ±0.25 db and over 80 to 400 cycles per second it is ±0.5 db. The calibration is independent of fluctuation of battery voltages, and for a.c. mains a neon stabiliser is used. The most suitable generator to use is the G.E.C. beat frequency oscillator.

The standard design is suitable for connection to a 230-V 50-cycle single phase a.c. supply, or to a 24-V, 0.25-A l.t. battery and a 120-V 5-mA h.t. battery. It can be adapted for l.t. battery supplies down to 16 V, and a design for operation from any particular a.c. mains supply can be provided.

An Electrical Factotum

Practically everything that can be offered in the way of small electrical equipment for domestic use has been found room for in a compact cabinet which SERVOGYRO ELECTRIC CABINETS, 3, Harriet Street, Knightsbridge, London, S.W.1, have developed. Almost cubical in shape, and about the height of an ordinary table, this handsome piece of furniture has doors all round, giving access to such appliances as an electric grill and oven, hot-plate, toaster, kettle, percolator, mixer and juice extractor, vacuum cleaner, radio set, clock, air conditioner, ozoniser, health lamp, vibro-massage equipment and warming pad. In addition to housing all these articles, the cabinet also serves as a bureau bookcase and cocktail bar, and can be easily wheeled from room to room.



The Servogyro electric cabinet

A Range of Fans

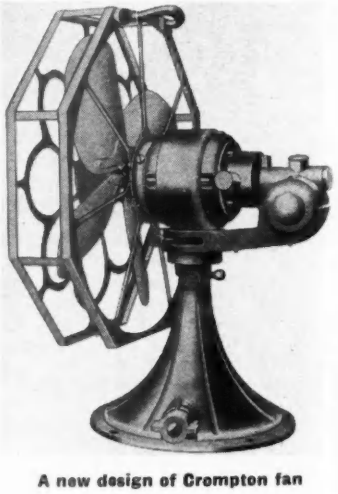
Unusual design characterises the new range of electric fans of CROMPTON-PARKINSON, LTD., Bush House, Aldwych, London, W.C.2. The guard is particularly strong and has a carrying handle at the top, satin silver lacquer being the standard finish. A special three-speed rotary switch provides simple control of three alternative speeds.

A specially treated fabric composition is used for the blades, which are lighter than metal equivalents, yet, it is stated, will not warp or get out of shape. The motor and base are totally enclosed, and wide angle oscillation can be obtained by pressing a lever. An earthing point is provided on the base so that three-core flexible can be used.

The leads between the motor and the base are protected by steel armouring taken through a rubber composition bush on the motor shell. The condenser is situated in the base, a cam-operated switch providing three speeds by condenser tappings.

Various models are available, including the 12-in. universal oscillating "Silver Queen," a similar 10-in. model known as the "Silver Prince," a 16-in. model, similar in design, called the "Silver King," a 10-in. fixed pillar universal fan, the "Regent," and the 10-in. fixed - pillar "Princess" (a.c. only).

The loadings of these fans vary from 27 W for the Regent working on a.c. (240 V) to 44 W for the "Silver Prince," and 76 W for the "Silver King" (a.c.) and 46 W for the d.c. model.



A new design of Crompton fan

New Books

Electric Wiring Diagrams. By W. PERREN MAYCOCK. Revised by H. C. FABIAN. Pp. 155; figs. 258. London: Sir Isaac Pitman & Sons. Price 5s.

The older generation of electricians have long been familiar with the ingenious diagrams of the late Perren Maycock. Early study of multiple switching and problems such as how to connect three switches to six lamps through a 4-plate ceiling rose, have afforded good practice for weightier problems.

This is the second edition of a manual composed from the larger book called "Electric Wiring, Fittings, Switches and Lamps," and it has been revised by Mr. Fabian particularly to suit City and Guilds pupils. The diagrams are very clear and ample enough to acquaint students and apprentices with the most common connections for lighting, power, cooking, telephones, bells, alarms and the like. Two drawings of typical transformer layouts for works are included in this edition.

The numerous bell circuits, however, are all shown operated by Leclanché cells and it is important now that students should be instructed in the proper applications of small transformers which have for some years displaced batteries. A new edition also should indicate approved methods of wiring for grid controlled clocks and an index would be desirable.

Patents for Inventions. By R. HADDAN (99 pp.), London: Sir Isaac Pitman & Sons, Ltd. 3s. 6d. net.

This should prove a useful little handbook to inventors and should enable them to avoid the more common errors whereby, unfortunately, much of their protection and rights are commonly endangered or lost. It outlines in the briefest possible manner the law relating to patents and a description of all the various legal processes of patent procedure. There is, moreover, a short survey of the patent laws in the British Dominions and Colonies and also in almost all foreign countries.

The book also gives some useful explanations of the part played by patent agents and also of the basis of their charges. The precepts for inventors arrived at in the preceding chapters are concisely set out at the end of this book.

The Low Voltage Cathode-Ray Tube and Its Applications. By G. PARR. Pp. 177; figs. 76. London: Chapman & Hall, Ltd. Price 10s. 6d.

In recent years the cathode-ray oscillograph has become an indispensable accessory to many branches of research work. Unfortunately, the present stage of its development is not advanced enough to render the apparatus "foolproof" and in order to use it correctly, and be able to detect the cause of any distortion of the image which may occur, it is necessary that the operator should have a sound knowledge of the instrument he is using.

The book under review deals with the subject in a thoroughly practical manner, and anyone interested in cathode-ray oscillographs will read it with benefit. The opening chapters describe the theory, construction and operation of both gas-filled and vacuum tubes. Many interesting points, including origin distortion, ionic oscillation and defocusing at high frequencies, are discussed at length. Subsequent chapters deal with the assembly of time-base units, including linear, elliptical, single-sweep, and sinusoidal types, and of mains units for supplying the high-voltage to the tube electrodes.

The values of all components are given, and such matters as the importance of correct earthing are pointed out; so that when any of the units described is built, no difficulty should be experienced in getting it to work correctly. Special applications of the tube such, *e.g.*, in radio testing and for recording heart and nerve impulses, are briefly dealt with.

A section on television is included, but this should be read rather as an illustration of an interesting application of the cathode-ray tube than as a treatise on this subject. A very extensive and useful bibliography is included at the end of the book.

Shorter Notices

"The Objective Rate Plan for Reducing the Price of Residential Electricity," by W. F. Kennedy. Pp. 83. London: The Oxford University Press. Price: 6s. 6d. net.

"Lessons and Problems in Electricity," by N. C. Page. Pp. 356; figs. 161. London: MacMillan & Co., Ltd. Price 12s. net.

"Television Up-to-Date," by R. W. Hutchinson. (Second edition.) Pp. 211; figs. 132. London: University Tutorial Press, Ltd. Price: 2s. 6d.

"Machine Drawing for Students of Electrical Engineering," by A. Bridge. Pp. 75; figs. 38. London: Blackie & Son, Ltd. Price 4s. 6d. net.

"Motor and Control Appliances," by G. H. Hall. Pp. 259; figs. 167. Price: 18s. "Fundamentals of Vacuum Tubes," by A. V. Eastman. Pp. 438; figs. Price 24s. London: McGraw-Hill Publishing Co.

"Electric Trains," Two volumes, by W. A. Agnew. Pp. 220 and 506; figs. London: Virtue & Co. Price 45s.

"Gases and Metals," by C. J. Smithells. Pp. 218; figs. 145. Price 18s. "Electrolytic Condensers," by P. R. Coursey. Pp. 172; figs. 112. London: Chapman & Hall, Ltd.

The Summer Number of *Punch* (1s.) is, if anything, funnier than ever in its pictorial skits on current affairs, crazes and habits. It includes some excellent three-colour illustrations.

"Classified Examples in Electrical Engineering"—Vol. II. "Alternating Current," by L. Gordon Monk. (Fourth edition.) Pp. 167; figs. London: Sir Isaac Pitman & Sons. Price 4s.

Electrical Imports of British Malaya

United Kingdom's satisfactory share

THE improvement in business in Malaya which set in last year as a result of the recovery in the prices of tin and rubber has been maintained. At the same time the situation has been favourably affected by the successful marketing of a number of other products such as copra, vegetable oils and pineapples. Purchasing power has expanded nearly all round and stocks have been reduced in many lines, notably building materials.

The extent to which the electrical trade has benefited is shown in the following table, based on the recently issued official returns, giving the values of the imports of the principal lines in 1936, with a note of increase or decrease compared with 1935. (One Straits dollar = 2s. 4d.) The grand total was $5,800,000 as compared with $5,240,000 in 1935, and the share of the United Kingdom $3,633,000 as against $3,067,000.

A feature of the trade in radio goods, which was rather below the 1935 level, was the improved position of the United Kingdom *vis-à-vis* the United States. While the latter retained its place in the business in receiving sets the United Kingdom had the larger share in the import of transmitting apparatus, radio-gramophones and accessories.

	1936. $ (000).	Inc. or dec. compared with 1935. $ (000).
Automobile lamps—		
Total	13,500	+ 2,300
From United Kingdom	9,500	+ 3,900
„ Japan	3,300	− 600
Flash-lamp bulbs—		
Total	76,000	+ 17,000
From United Kingdom	1,000	− 200
„ United States	15,000	− 2,000
„ British Dominions	1,500	+ 900
„ Japan	17,000	− 3,000
Electric hand flash lamps—		
Total	264,000	+ 54,000
From United Kingdom	2,500	+ 1,100
„ British Dominions	181,000	+ 54,000
„ United States	31,800	− 8,700
„ Japan	2,800	− 10,800
Other electric lamps—		
Total	276,000	+ 22,000
From United Kingdom	227,000	+ 24,000
„ Europe	23,800	+ 2,400
„ Japan	22,500	− 6,300
Lighting accessories and fittings—		
Total	190,000	− 16,000
From United Kingdom	152,000	+ 1,000
„ Japan	25,000	− 12,600
Batteries and accumulators—		
Total	199,000	− 10,000
From United Kingdom	128,000	− 29,000
„ United States	34,000	+ 9,000
Batteries for hand flash lamps—		
Total	723,000	+ 42,000
From United Kingdom	12,650	+ 9,650
„ British Dominions	112,000	+ 52,700
„ United States	316,000	− 187,000
„ Japan	4,800	− 1,700
Electrical instruments other than telegraph or telephone—		
Total*	114,000	+ 9,000
Submarine telegraph and telephone cables—		
Total*	180,000	− 54,000
Other telegraph and telephone wires and cables—		
Total*	36,800	+ 11,800
Other (rubber) insulated wire and cables—		
Total	400,000	− 62,000
From United Kingdom	368,000	− 48,000
„ Europe	15,700	− 8,800
Other (not rubber) insulated wire and cables—		
Total	341,000	+ 142,000
From United Kingdom	331,600	+ 132,000
„ Japan	5,300	+ 2,000
Radio receiving sets, excluding valves—		
Total	336,000	†
From United Kingdom	78,500	
„ Europe	57,400	
„ United States	198,000	
Radio-gramophones—		
Total*	27,000	†
Radio transmitting apparatus, excluding valves—		
Total*	63,500	†
Valves—		
Total	35,000	+ 7,000
From United Kingdom	14,700	+ 5,700
„ United States	18,400	+ 400
Other radio accessories and parts—		
Total	96,000	†
From United Kingdom	44,800	
„ United States	36,800	
Telegraph and telephone instruments and apparatus—		
Total*	199,000	+ 108,000
Electrical goods and apparatus not elsewhere specified—		
Total	1,045,000	+ 52,000
From United Kingdom	594,000	+ 33,000
„ Europe	95,000	− 1,000
„ United States	306,000	− 6,000
„ Japan	33,000	+ 17,000
Transformers and convertors—		
Total*	216,000	− 10,000
Generators—		
Total	197,000	+ 65,000
From United Kingdom	163,000	+ 46,000
„ Europe	33,000	+ 30,600
Motors—		
Total	310,000	+ 117,000
From United Kingdom	265,000	+ 96,000
„ Europe	33,500	+ 22,900
Electrical machinery not elsewhere specified—		
Total	464,000	+ 145,000
From United Kingdom	418,000	+ 123,000
„ Europe	33,500	+ 16,800

* Mainly from United Kingdom.

† Comparative figures not available.

In the Courts

Damages Against Supply Company

IN the King's Bench Division on Wednesday Mr. Justice Macnaghten concluded the hearing of an action brought by Mrs. Edith Caston, Iver, Bucks, to recover damages for personal injuries sustained by her through the alleged negligence of the defendants, the Uxbridge and District Electric Supply Co., Ltd., or their servants. It appeared that the plaintiff's husband in October, 1935, hired an electric cooker from the defendant company, and her case was that in the following month the defendants' servant in repairing and putting the cooker into working order had failed properly to connect the hot-plate of the cooker to earth and thereby had left it in an unsafe and dangerous condition with the result that when on November 18th, 1935, plaintiff was about to remove a saucepan which was boiling over, on touching the handle of the saucepan she received a severe electric shock by reason, as she alleged, of the hot-plate having no proper or sufficient earth connection. The plaintiff alleged that she had sustained a severe nervous shock and damage to the muscles of her right hand.

The defendants denied negligence and liability, and alternatively pleaded that the plaintiff had been guilty of contributory negligence in failing to keep any proper lookout for her own safety and, being aware that the saucepan was in fact boiling over on to the hot-plate, touching the handle thereof without first turning off the electric power.

During the course of the plaintiff's evidence it was stated that in the defendants' agreements for the hire of the cooker there was a clause which exempted them from liability, and that was the reason why the plaintiff's husband was not joined as co-plaintiff.

It was announced by Mr. Robertson that a settlement of the action had been arrived at on the terms that the defendants had agreed to pay Mrs. Caston £275 damages and the taxed costs.

Judgment was entered accordingly.

Action for Damages Fails

In the King's Bench Division on June 3rd before the Lord Chief Justice and a special jury Mrs. Celia Bennett, Golders Green, N.W., claimed to recover damages against the Hendon Electric Supply Co., Ltd., for alleged malicious prosecution.

Mr. Doughty, who appeared for plaintiff, said that she was a dancing instructress and singer and lived at the house in Cleveland Gardens with her husband and family. The defendant company was the supplier of electricity in that district, the plaintiff being responsible for the payment for the electricity supplied to the house. Her professional engagements and duties frequently caused her to be away from home, and this happened when the company sent in their account for the supply of electricity for the quarter ended September 29th, 1935. Mrs. Bennett was at the time in Bournemouth. The amount of the account was £1 0s. 6d. Mrs. Bennett sent the money to a servant with instructions to pay the account, but it was forgotten and eventually one of the company's inspectors called at the house and disconnected the supply. Mrs. Bennett knew nothing about this, and whilst she was away a mechanic was called in to examine the wireless set and he reconnected the electricity supply. The amount of £1 0s. 6d. was paid to the company, but in the following January, after an inspector of the company had called, Mrs. Bennett received an intimation from the company that she would be prosecuted for unlawfully using electricity without its consent, and the company launched proceedings before the Hendon magistrates for the purpose of enforcing against Mrs. Bennett the penalty of £5. A summons was issued, but knowing nothing about it Mrs. Bennett did not appear, and she was arrested on a magistrates' order. When the case came before the magistrates it was dismissed without the defence being called upon. In these circumstances Mrs. Bennett alleged that the defendants had acted without reasonable and probable cause in taking the proceedings, entitling her to recover damages.

The defence was a denial that there was an absence of reasonable and probable cause for the proceedings which had been taken against Mrs. Bennett.

Mrs. Bennett, in cross-examination by Mr. Beresford, K.C., denied that her husband and some of her family were living in the house when the supply of electricity was cut off. She had had experience of a disconnected supply before and knew that the company could charge 10s. 6d. for reconnecting it. Her husband did not tell her that he had seen the final notice calling on her to pay the account and warning her that the light would be cut off if she did not pay. When she offered to pay the bill she did not know that the supply had been cut off.

At the close of the plaintiff's case the Lord Chief Justice ruled that there was no absence of reasonable and probable cause for the proceedings which had been taken by the defendants, and entered judgment for them with costs.

An E.T.U. Dispute

In the Chancery Division on June 4th Mr. Justice Luxmoore had before him the action of the Electrical Trades Union against Arnup and others on a motion on behalf of the plaintiff Union and its Executive Council for an order restraining the defendants, A. E. Arnup, R. Stanton, F. A. Sanders, A. G. Trinder, S. A. Truman, R. Jackson and F. Lister, until the trial of the action or further order from collecting from members of the Croydon branch of the plaintiff union any contributions payable by such members under the rules of the union or from representing or holding out to such members that the defendants or any of them were entitled to collect any such contributions, or from using any stationery of the union and from disposing of such contributions except by paying them into the union's central banking account. The plaintiffs also asked for a similar order directing the defendant Mr. Lester to hand over to the plaintiffs the roll book of the Croydon branch of the union or any documents containing the names of the members of the branch.

Mr. Alexander Grant, K.C., in support of the motion, said the litigation arose out of a quarrel between the defendants and the union. There had been a large contract at Earl's Court and at the end of last year some of the men engaged declared an unofficial strike. The central body, through the Executive Council, considered the matter and took the strong course of expelling the London Committee from the union for the conduct of the strike. One of the expelled members was Mr. Lester, who belonged to the Croydon branch, and that branch purported to establish a separate union. He (counsel) understood that there was to be a meeting of the branch on June 8th which might possibly bring the dispute to an end. He asked that the money already collected, some £20 a week for seven or eight weeks, be put into separate accounts pending the trial of the action.

Mr. J. R. O. Jones, for the defendants, in answer to his Lordship (who suggested that the motion should stand over for a week), said he was willing to give an undertaking that no money would be collected from members of the branch and no moneys expended after that day (June 4th). The money already collected was in the Post Office Savings Bank and defendants were willing that the bank book should be deposited with the defendants' solicitors.

On this and other undertakings being given on behalf of the defendants his Lordship directed that the further hearing of the motion should stand over until to-day (Friday).

Colliery Company Fined

Two fines of £25 and one of 10s. were imposed on the Powell Duffryn Associated Colliery Co. at Merthyr Police Court last week, for neglecting to observe that adequate precautions were taken to prevent any conductor apparatus becoming accidentally electrically charged when people were working on it. It was stated that on January 11th two employés were killed by electric shock at Dowlais coke ovens, along which were two sets of bare trolley wires for driving equipment on top of the ovens. The stipendiary magistrate, Mr. J. Bowen Davies, said it had been stated that if the switches were tied down, that was an adequate precaution; but, in fact, the switches were not tied in this case. Enforcement of the fines was suspended for twenty-one days.

Sequel to Witton Accident

As the result of a fatality at its Witton works on March 16th, the General Electric Co., Ltd., was summoned at the Birmingham Police Court on June 4th under the Factory Act for not providing a handle on an electric switch. The man who lost his life was John White, B.Sc.

Miss Pease (H.M. Inspector of Factories) said that the company deeply regretted the fatality, which happened at about 11 o'clock at night when some testing work was being done. One of the switches did not have a handle, and as a result, when White caught hold of it, he received a shock at 600 V and died before he was taken to hospital. Miss Pease said she did not know of any other electrical accident having happened in the factory, where they were anxious to prevent accidents.

Mr. Colin Coley, who appeared for the company, said there were three other installations White could have used with perfect propriety and safety, but in using both hands on the switch in question he came into contact with live metal.

The Chairman said there was no doubt there had been some neglect, but the magistrates felt that the case would be met by a fine of £50 and 16s. special costs.

Diesel Traction in India

IN a paper on Diesel railway locomotives submitted (not to be read) to the Institution of Mechanical Engineers, Mr. G. K. Ambady, assistant electrical engineer of the North-Western Railway, India, gives an analysis of the various items of locomotive operating costs and the degree to which each is influenced by the type of tractive unit selected, namely steam or Diesel. In the course of this the author says he prefers such auxiliaries as the cooling fan, cooling water pump, vacuum pumps and compressors, to be electrically driven. Generator brush holders arranged on a rotatable ring facilitate attention to the brushes. Cables laid in watertight ducts of conveniently short length, bolted instead of brazed, assist dismantling and inspection. Electric welding is being increasingly employed to reduce weight and manufacturing costs. Care is necessary to minimise residual stress in adjacent parts, but with suitable design and skilled operators no trouble has been experienced even with welded sections across the line of forces produced on the power stroke.

Business and Industrial Notes

The Week's News. Showrooms and Exhibitions. New Installations. Overseas Trade. Publicity Material. Trade Announcements. Prices of Materials. Liquidations and Bankruptcies.

Wages in the Electrical Contracting Industry

In accordance with the agreement between the Electrical Trades Union and the National Federated Electrical Association, the following are the new rates of pay in the electrical contracting industry:—Grade "A": 1s. 9¼d. per hour (this rate includes travelling allowance). Grade "B": 1s. 7¼d. per hour. Grade "C": 1s. 6d. per hour. Grade "D": 1s. 4¾d. per hour. These rates come into operation on the second pay day in June, 1937, for the period covered by that pay day and remain current up to and including the first pay day in June, 1938, for the pay period covered by that pay day. Until further notice the Grade "A" rate is subject to an addition of 5 per cent., making a total of 1s. 10¼d. per hour, while under Grade "B," in the Mersey area, within a radius of ten miles of the Liverpool landing stage and also including the towns of Runcorn, Widnes and St. Helens, until further notice, an addition of 1d. per hour is payable in lieu of travelling time, making a total of 1s. 8¼d. per hour. The rate for Belfast (Grade "C") is subject to an addition of 3 per cent. to the standard rate until further notice. An agreement has been concluded between the E.T.U. and the Association as an addition to Clause 9 of the London Working Rules, which is as follows:—"Where the employer has no 'shop' as defined within the area covered by these rules, actual fares shall be paid from Charing Cross to the job and from the job to Charing Cross, except in such cases as the men receive the appropriate allowance from the employer's shop outside the area covered by these rules." This addition to the rules will operate as from September 1st, 1937.

Australian Registered Contractors

With the introduction last year in Victoria, Australia, of regulations governing the registration of electrical contractors it was felt that an important step had been taken towards achieving stability in contracting work. The *Electrical Engineer and Merchandiser* reports that contractors have been dissatisfied, however, with the official register drawn up by the State Electricity Commission, claiming that it includes the names of many who are not strictly contractors. In view of representations made, the Commission has now stated that the list will be revised, and persons now registered as contractors will be classified into groups according to the circumstances under which they engage in business. Each group will then be made the subject of a decision as to whether registration should or should not be renewed after June 30th. Such decisions will be applied to all future applications for registration.

Registered Electrical Contractors

At the last meeting of the Executive Committee of the National Register of Electrical Installation Contractors the following applications for registration were accepted:—

Christy Bros. & Co., Ltd., Chelmsford; B. C. Garman, Ltd., Harrow; N. A. Constable, Ltd., Manchester, 2; Alan H. Douglas, Hr. Broughton, Salford, 7; Eric Grimditch, Middleton, Nr. Manchester; and Sparrow & Co., Gloucester.

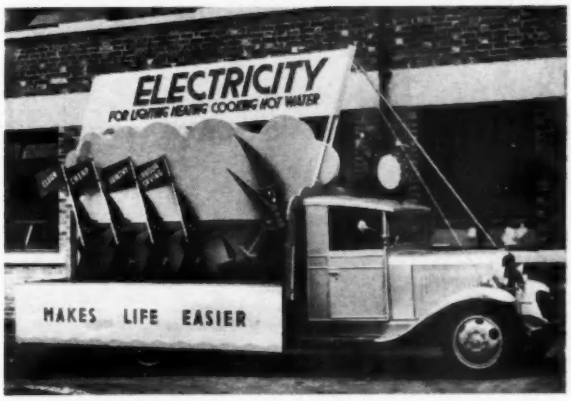
At the same meeting nine applications were declined.

New High-efficiency Lamp

We recently referred to a report that a new type of lamp had been developed by the American General Electric Co. The *Electrical World* states that the new high-frequency tungsten filament increases the light output by 10 per cent. for the same energy consumption. According to Mr. J. E. Kewley, vice-president in charge of the General Electric's incandescent lamp department, laboratory tests have revealed that a 60-W lamp in the 100- to 130-V class, equipped with the new filament, not only gives 10 per cent. more light, but shows greatly improved maintenance of efficiency throughout its active burning life.

Solihull Carnival

The accompanying illustration shows the E.D.A. processional car which the Birmingham Corporation Electric Supply Department entered at the recent annual carnival procession at



The E.D.A. processional car entered by Birmingham Electric Supply Department at the Solihull Carnival

Solihull. The Department's representative who accompanied the car was dressed to represent the "I'm Electric" figure, and the display was awarded the prize for the best decorated vehicle.

I.F.S. Electrical Imports

There was again an active tone as regards the imports of electrical machinery and cognate material into the Irish Free State during April last, a total value of £91,864 being attained as compared with £86,647 in the corresponding month of 1936.

The accompanying table gives the details of the imports during the four months ended with April last as compared with the corresponding period a year ago.

	Jan.-April, 1936.	1937.
Electric motors	19,530	16,546
Other electrical machinery	67,629	75,131
Dry batteries and parts	5,170	5,219
Electric lamp bulbs	19,634	7,890
Electric lighting accessories, fittings and parts	30,159	25,723
Electric wires and cables, insulated	29,025	26,662
Telephone and telegraph apparatus	3,549	33,204
Radio receivers, complete	17,340	24,857
Radio gramophones, complete	465	494
Other radio apparatus, fully or partly assembled	2,050	4,002
Radio parts and accessories	21,660	29,299
Other electrical goods and apparatus	90,395	99,099
Totals	£306,606	£347,426

As will be seen, so far this year there has been an increase in the imports of £40,820. Four of the schedule items show a decrease and eight an advance, the most notable increase being in telegraph and telephone material and radio receiving sets and allied material.

Engineers and the Strike Ballot

The annual conference of the Amalgamated Engineering Union at Scarborough last week rejected a resolution com-

Two stands at the I.M.E.A. Exhibition. (Left) the display by the English Electric Co. and (right) the G.E.C. exhibit

mitting the Union to taking a strike ballot if a claim for improved conditions were not fully conceded by employers. An amendment, which was carried, urged that, in view of the existing wage negotiations and the demands from divisions, the conference should instruct the Executive Council at the termination of the present negotiations to continue to press further claims in conformity with the engineers' charter.

Argentine Electrical Exports

The Argentine electrical import trade made a further advance

The new London showroom of Elexcel, Ltd.

last year, the grand total being in round figures 37,880,000 pesos (at approximately 17 to the £), as compared with 29,760,000 pesos in 1935. From the following statement, which is based on the recently-issued foreign trade returns of the Republic, it will be seen that the advance covered all important groups except accumulators and radio-telephone parts. The latter, in which the United States does the bulk of the business, were, however, well above the level in 1934. The Argentine import market has improved greatly in recent months and future prospects are considered bright in view of the satisfactory outlook for the export trade. Building has been particularly active and the trend of purchasing is towards goods of the better qualities. Thanks to the Anglo-Argentine agreement the United Kingdom is in an excellent competitive position, but the United States is showing increasingly keen interest in the market.

	1936. Pesos (000).	Inc. or dec. on 1935. Pesos (000).
Accumulators and parts	1,188	− 106
Batteries	1,633	+ 408
Jars for batteries and accumulators	439	− 56
Radio-telephone apparatus	843	+ 24
Receiving sets	3,251	+ 538
Loud speakers	370	+ 62
Radio-telephone parts	2,266	− 306
Telephones and parts	1,439	+ 322
Circuit-breakers, switches, etc.	1,175	+ 17
Incandescent lamps	1,717	− 289
Other electric lamps	245	+ 2
House-service meters	2,206	+ 721
Insulating tubes	913	− 41
Unspecified electrical material	5,667	+ 1,830
Telephone wires and cables, iron or steel	4,729	
Electric wires and cables, copper	4,838	+ 661
Electric flex	2,148	+ 1,795
Motors and dynamos	2,811	+ 1,019

Orders Recently Booked

Sunbeam Commercial Vehicles, Ltd., has received a further order from Wolverhampton Corporation for trolley-bus double-deck chassis, representing the ninth repeat order from this authority.

Further substantial orders have been placed by the London Passenger Transport Board in connection with the provision of new rolling stock for extensions of the tube railway system. These orders cover the supply of 1,600 traction motors for the new motor-coaches and have been placed with Crompton Parkinson, Ltd., and the General Electric Co., Ltd., each of which will manufacture 800 motors. The combined value of the orders is over £600,000. The design of the new motors was evolved jointly by the two companies, which have made arrangements to ensure that similar and interchangeable machines are supplied by both concerns. The whole design is to the approval of the chief mechanical engineer (railways) of the Board. As compared with previous equipments supplied for the tube trains of the L.P.T.B., the new type of motor enables substantial improvements to be made in train acceleration, speed performance and passenger capacity. In existing types of rolling stock the space above the traction motors is not available for passenger accommodation, the floor being at a higher level there than throughout the rest of the train. The new design of motor provides increased motor capacity and at the same time permits of a sufficiently low car floor above the motors to allow for passenger accommodation. With the new motor equipments substantial improvement is possible in the rate of acceleration, and by the design of the motor for an extensive range of field control particularly flexible speed characteristics are obtained. This order is said to be the largest for traction motors yet placed in this country.

New Elexcel Showroom

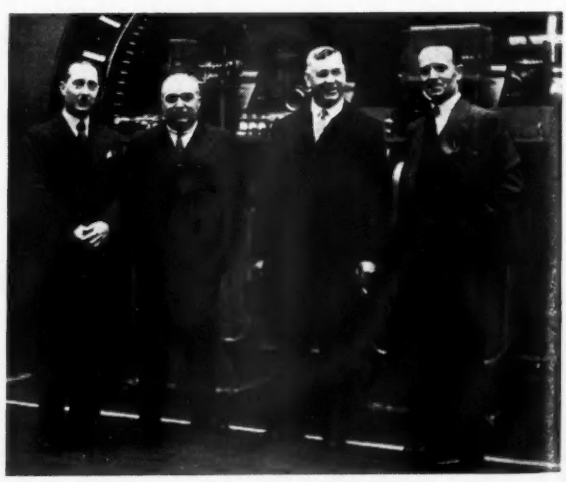
A new showroom has been opened at Maidstone House, Berners Street, W.1, by Elexcel, Ltd., for the display of "Xcel" domestic electric appliances. An attractive internal decorative scheme has been chosen which forms an excellent background for the appliances. The walls are in a pastel shade, relieved by a modernistic yet subdued motif. The fittings are of limed oak with venetian red counter-tops, and a black skirting has been employed to separate them harmoniously from the beige and fawn tones of the carpet. Typical of the careful planning of the showroom, from the visitors' point of view, is the fact that these fittings are themselves divided into sections by limed oak partitions, each division containing a separate group of associated appliances. To produce the correct "atmosphere" oiled silk curtains in shell pink are hung in the kitchen section, while modern domestic architectural design is followed in the demonstrator's annexe, which has long horizontally sashed windows overlooking the showroom. The modern note sounded by the decoration scheme is sustained in the lighting, concealed lamps in a large inverted bowl surmounting a tall column in the centre of the room being assisted by unobtrusive wall fittings. In addition, the centre column is effectively floodlighted from lamps concealed within a cabinet around the base, which accommodates panel fires on display.

Sheffield Bursary Fund

The Worshipful Company of Tin Plate Workers, alias Wire Workers, has decided to appoint another bursar under the Sheffield Bursary Fund and invites nominations from the University itself and also from the trade associations which contributed to the fund. The bursary will amount to £100 and will be tenable for one year, but the company has in mind the possibility of extending it for a further period, not exceeding two years, in the case of a satisfactory scholar and if occasion requires. The conditions of the grant are that study must commence at Sheffield University at the beginning of the scholastic term in October next, and must be confined to research in metal plate or wire work, ferrous or non-ferrous. Nominations should be submitted to the clerk of the Worshipful Company, Bakers' Hall, Harp Lane, E.C.3, not later than June 30th.

Works Visit

On June 3rd the Rt. Hon. R. L. Butler, Prime Minister of South Australia, accompanied by Prof. A. L. Campbell, LL.D., of the University of Adelaide, and Mr. W. H. Flannagan,



Australian visitors at the English Electric Stafford Works, showing (left to right), Mr. G. H. Nelson (chairman and managing director), Prof. A. L. Campbell (University of Adelaide), Rt. Hon. R. L. Butler (Prime Minister of S. Australia), and Mr. J. Rogers (general manager, Stafford)

paid a visit to the Stafford works of the English Electric Co., Ltd. They were conducted round the works by Mr. G. H. Nelson, chairman and managing director of the company. Besides the numerous Australian contracts the Prime Minister was particularly interested in matters related to the employment of labour and the favourable conditions which operate at Stafford. The visitors were introduced to a number of the staff, including the chairman of the Works' Committee.

E.D.A. Luncheons

The North-Western Area Committee of the British Electrical Development Association has arranged two luncheons in connection with the refrigeration campaign, one to be held in Liverpool on June 15th and the other in Manchester on June 17th. Professor G. E. Scholes, M.B.E., M.Sc., of Liverpool University, and Mr. P. J. Robinson will be the principal speakers at the Liverpool gathering, and Councillor Emrys Lloyd Jones, M.B., Ch.B., at Manchester.

Two New Display Pieces

The Hotpoint Electric Appliance Co., Ltd., has recently prepared two new displays, one of which is for use with washing machines and the other with vacuum cleaners. In the accompanying illustration we show a window display installed in the showrooms of the Nottingham Corporation Electricity Department, in which the display screen for washing machines is used in conjunction with the "Redman" cut-out which is also available to the trade. These display pieces can be obtained from all offices of the Hotpoint Company.

A Hotpoint display at the showrooms of the Nottingham Electricity Department

The Great Hertfordshire Show

Over six hundred farms and agricultural premises in Hertfordshire are already utilising electricity, and the North Metropolitan Electric Power Supply Co. hopes to improve the position further as a result of its exhibit at the Great Hertfordshire Show which is to be held on June 23rd and 24th in Hatfield Park. Most of the apparatus will be shown in operation and the agricultural display will be divided into sections for poultry, dairy and general farming. Interesting new equipment will include electric sterilisers, egg and tomato graders, incubators, automatic stokers and barn machinery. Demonstrations will be given of poultry plucking, water pumping and milk cooling. For domestic use the electric cookers, washing and ironing machines, water heaters, refrigerators, &c., can be purchased on attractive terms and with electricity at ½d. per kWh cost little to run.

I.M.E.A. Convention Photographs

We regret that in two pictures appearing on page 828 of our last issue we described the Lord Mayor of Birmingham (Alderman Horace Roberts) as the Lord Mayor of Manchester.

New Electricity Showrooms

The Middlesbrough Town Council proposes to erect electricity showrooms in Russell Street at a cost of £21,000, and application is to be made to the Electricity Commissioners for sanction to borrow this sum.

Swedish Electrical Exports

According to the *Swedish Economic Review* there was a fall in the value of electrical machinery exported from Sweden during 1936. The total is given as 22,287,000 kr. as compared with 25,170,000 kr. in the preceding year. There was, however, a substantial advance in exports of telephone and telegraph apparatus from 5,000,000 kr. to 6,563,000 kr. (19.4 kr. = £1).

Social Events

Two new sections have recently been added to Henley's (head office) social club to cater for golf and cricket. The Henletel Golfing Society (men's section) held its first meeting on June 4th, when the first round of the Sir Montague Hughman challenge cup was played off. Also in the fixture list is a medal competition on July 2nd and a bogey competition on July 19th. The committee consists of Messrs. W. F. Bishop, A. H. M. Jacob, and B. C. Wilkins, with Mr. W. H. Copper as secretary. The Henletel Cricket Section fixure list includes matches against Edmundsons, an Egyptian team, Maples and Oxo. The club has a few vacant dates for away matches and would be pleased to hear from any cricket secretaries in the electrical industry. On June 11th the social club will hold its third dance-cruise on the Thames, from Westminster to Gravesend and back.

German Enterprise in Iran

A new company has been formed in Berlin under the title of Siemens Gesellschaft für Iran to promote the sale of German products in Iran, the share capital being 50,000 marks.

Trade Announcements

The United Steel Companies, Ltd., have removed their Sheffield district sales office to 6, East Parade, Sheffield, 1.

Greig Bros., Ltd., radio and electrical engineers, have opened additional premises at 16, Upper Craigs, Stirling, for the sale of electrical goods only.

Thermovent (1936), Ltd., is moving its London offices to 46, Albemarle Street, W.1 (telephone Regent 3477).

Aerialite, Ltd., has transferred the whole of its plant and offices to larger premises at Castle Works, Stalybridge, Ches.

Lionel Robinson & Co., Ltd., are removing their stores and trade counter on June 21st to 28, Furnival Street, London, E.C.4.

Eastern Engineering & Commerce, Ltd., has removed to 3, Pavilion Buildings, Brighton.

Two more stands at the I.M.E.A. Exhibition: Hotpoint Electric Appliance Co., Ltd., and British Sangamo Co., Ltd.

The Outlook for Copper

A review of base metal conditions has been issued by the British Metal Corporation, Ltd., in which it outlines the trend of consumption and production of copper, lead, and spelter.

The review states that abnormal conditions have ruled in the metal markets in the last few months. Heavy and, at times, frenzied buying by both speculators and consumers swept prices quickly upwards to high levels in the first half of March. Standard copper reached £78 per ton, lead £36 per ton, and spelter £37 per ton. A severe recoil inevitably followed, and in little more than a month prices fell by about one-third from these peaks. The tone is now steadier, but

Members of the U.S. National Research Council at the G.E.C. Research Laboratories, Wembley

day-to-day fluctuations are still wide, indicating that considerable uncertainty exists.

The survey excludes the United States except in so far as it affects the position in the rest of the world. The trend of consumption is shown in the following table, which excludes secondary metal, *i.e.*, metal reclaimed from scrap. The 1929 totals of lead and spelter consumption were the highest which

WORLD CONSUMPTION, EXCLUDING THE UNITED STATES.
('000s long tons.)

	Copper.	Lead.	Spelter.
1929	875	1,020	900
1932	655	830	640
1935	1,095	1,095	920
1936	1,125	1,130	985

were reached before the slump; the greatest copper consumption was 925,000 tons in 1928. These totals were exceeded in 1935, the third year of recovery from the low levels of 1932, and in 1936 there was a further but slower growth. This year it is more difficult than usual to estimate the volume of actual consumption since in recent months deliveries, particularly of copper, have run ahead of current requirements. World-wide rearmament has made the task of a prophet harder, but it seems certain that consumption of the metals is still growing. Prosperity is spreading; the rise in commodity prices is restoring the fortunes of primary producing countries, and is causing a larger demand for manufactured goods. The electrical engineering and motor trades in the chief countries are as busy as ever. Activity may contract in some trades, but the total rise of the metals in the world—for armaments and for peace industries—is still expanding. The output of copper by the various copper-producing companies during 1936 was 1,119,000 tons, the chief feature being the output of Northern Rhodesia, which, although restricted by voluntary agreement with the Belgian and Chilean producers, has grown from under 10,000 tons in 1930 to 142,000 tons in 1936. The review states that the aggregate increase this year over last may be at least 400,000 tons, and that production must run well ahead of actual consumption, unless consumption surpasses all expectations.

Prices of Materials

Henry Gardner & Co. report, June 9th: Copper bars (best selected), sheet and rod £93, no change. English pig lead, £25 10s., 5s. dec. Mercury, £15 5s., 7s. dec. Spelter, £22, 15s. dec. English block tin, £251, £1 15s. inc.

Frederick Smith & Co. report, June 9th: No change in the price of electrolytic copper bars, wire rods and h.c. wire, and silicium bronze wire.

Edward Till & Co. report, June 10th: No change in the price of India rubber, Para fine.

A New E.C.A. Sub-branch

On May 31st a meeting of newly elected members of the E.C.A. in the district was held at the Golden Fleece Hotel, Chelmsford. The meeting formally resolved to form the Chelmsford and District Sub-Branch. Officers were appointed as follows:—Chairman: Mr. A. S. Playle; vice-chairman: Mr. A. Shearman; hon. secretary and treasurer: Mr. H. Lowe; delegate to London Section: Mr. A. S. Playle. A discussion followed, consideration being given to further development in the area and to the future programme of the sub-branch. Any electrical contractor interested is invited to write to the local secretary at New Road, Great Baddow, Essex, or to the director and secretary of the E.C.A. at Africa House, Kingsway, W.C.2.

U.S.A. Visitors to Wembley Research Laboratories

A party of members of the National Research Council of the United States visited the Research Laboratories of the General Electric Co., Ltd., at Wembley, on June 4th. The party comprised business executives and industrialists who are touring Europe to study research in its relation to industry, their leader being Mr. Maurice Holland, director of the National Research Council. They were welcomed at the laboratories by Mr. M. J. Railing, vice-chairman and joint managing director of the G.E.C., and by Mr. C. C. Paterson, director of the laboratories. After a tour of the buildings an interesting discussion took place, followed by lunch at the Rest Hotel, Kenton.

New Applications for Plastic Materials

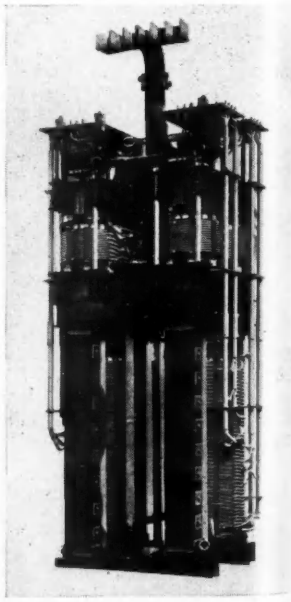
May & Baker, Ltd., 42 and 43, St. Paul's Churchyard, E.C.4, draw our attention to a number of applications to which their cellulose acetate plastic material, "Rhodoid," has recently been put. This material, which is obtainable transparent, translucent, or opaque, is available in sheets, rods, and tubes, or in powder form for injection or compression moulding. Labels, scales, and dials of all kinds, telephone mouldings, vacuum cleaner parts, scientific instruments, radio apparatus, etc., are a few of the better-known uses, but more recent applications, for which the Coronation was largely responsible, are colour floodlighting filters and other outside illuminated display work. For the latter purpose the Corporations of Southend-on-Sea and Guildford have, we understand, found it very satisfactory, and, still more recently, it has been incorporated in coloured torches employed at the Aldershot Tattoo. "Rhodoid" is used for lampshades, and owing to its good dielectric properties and tensile strength the material in powder form is suitable for moulded electrical parts.

A.S.E.A. in Poland

The *Financial Times* reports that the Swedish General Electric Co. (A.S.E.A.) has recently purchased a factory in Poland with a view to manufacturing there small and medium-sized electric motors, transformers, &c. The purchase price is reported to amount to about Swedish kronen 1,000,000 (£51,700).

A Furnace Transformer with Special Features

The 600-kVA furnace transformer illustrated was recently supplied by the British Electric Transformer Co., Ltd., to the Birmingham Electric Furnaces, Ltd. It has several unusual features in design, the special reactances, tapping switches and other items of equipment all being mounted on the transformer itself. Rated at 600 kVA, 2/3 phase, it is oil cooled and will be employed to supply energy to a three-phase arc furnace. The normal voltage ratio is 7,000/195; numerous tappings, however, are provided at frequent intervals down to 80 V, and a tapped reactor is incorporated to provide varying reactances up to 35 per cent. Any one of the different reactance values can be obtained with any of the voltage tappings. Variation of ratio is effected by an off circuit tapping switch which controls four values of reactance and four tapping ratios. Reactance and voltage are changed simultaneously. Connection to the switch is made from a terminal board at the top of the transformer through an arrangement of links, and the switch is remote manually operated. A special interlocking arrangement prevents misoperation.



Furnace transformer with special reactances and tapping switches

New Catalogues and Lists

Harcourts, Ltd., Stanhope House, Kean Street, London, W.C.2.—A new illustrated catalogue of lighting fittings, including two new models.

Alfa-Laval Co., Ltd., Great West Road, Brentford.—A catalogue of electric cream separators.

C.A.V.-Bosch, Ltd., Acton, London, W.3.—A booklet on fuel injection equipment for oil engines.

Bakelite, Ltd., 68, Victoria Street, London, S.W.1.—A booklet describing "Trefoil" laminated bakelite.

Curtis Lighting Co. of Great Britain, Ltd., Aldwych House, London, W.C.2.—Two folders illustrating concealed and pendant lighting units.

Harland Engineering Co., Ltd., "B.E.P. Works," Alloa.—A leaflet dealing with fabrication.

J. B. Hyde & Co., Ltd., Wythenshawe, Manchester.—A booklet has been issued describing and illustrating the company's new premises.

David Brown & Sons (Hudd.), Ltd., Huddersfield.—Horsepower calculators for "Radicon" worm reducers and cone ring couplings.

A. Reyrolle & Co., Ltd., Hebburn-on-Tyne.—Pamphlet No. 988, dealing with cable couplers.

Siemens Electric Lamps & Supplies, Ltd., 38-39, Upper Thames Street, London, E.C.4.—Electric wiring systems and "Sieray" electric discharge lamps are dealt with in two new catalogues.

Callender's Cable & Construction Co., Ltd., Hamilton House, Victoria Embankment, London, E.C.4.—A booklet dealing with "Callender" installations.

Sun Electrical Co., Ltd., 118-120, Charing Cross Road, London, W.C.2.—A catalogue of vacuum cleaners and floor polishers.

Bankruptcy Proceedings

N. Hall, trading as Hall & Co., 66, Margaret Street, Ashton-under-Lyne, and also at 278, Stamford Street, Ashton-under-Lyne, under the style of Horners, wholesale and retail radio dealer.—When debtor had been questioned regarding various transactions concerning the transfer of property to creditors, his public examination was closed at the Town Hall, Ashton-under-Lyne, recently. His statement of affairs showed gross liabilities of £2,986, of which £2,186 was expected to rank for dividend. The assets were estimated to realise £1,196.

E. M. Swift, 10, Joinings Bank, Langley Green, Worcestershire, electrical engineer.—The first meeting of creditors herein was held at the Official Receiver's Office, 159, Gt. Charles Street, Birmingham, on June 3rd. It was reported that the ranking liabilities amounted to £264, and there were estimated assets of £142, leaving a deficiency of £122.

M. Lazarus and **J. Lazarus,** trading as Langdons Radio, 217, Golders Green Road, Golders Green, London, N.W., lately 13, Craven Park Road, Willesden, Mdx.—M. Lazarus applied for his discharge on June 4th at the London Bankruptcy Court before Mr. Registrar Parton. Mr. V. Armstrong, Assistant Official Receiver, said the debtor failed in April, 1931, with liabilities of £388 and no assets. The failure was attributed to trade depression, heavy overhead expenses and keen competition. The discharge was granted subject to debtor's consenting to judgment for £200, of which £50 is to be paid before the discharge order is signed and the balance by weekly instalments of £1.

W. F. Welford, electrical engineer, "Roseberry," Alexandra Road, Shanklin, I. of W.—Discharge suspended for three months until August 5th, 1937.

R. S. Lees (R. S. Lees & Co.), electrical factor, 21, Gledhow Park Road, Leeds.—Trustee, Mr. H. C. Bowling, 24, Bond Street, Leeds, Official Receiver. released May 21st.

E. Aveyard (Alpha Electric Co.), electrical engineer, 14, Arnold Avenue, Hyde.—Last day for receiving proofs for dividend June 16th. Trustee, Mr. P. M. Milward, Byrom Street, Manchester, Official Receiver.

C. E. Wheat (Radio Stores), lately trading at 2, Lichfield Road, Stafford, now residing at Haughton, near Stafford.—Last day for receiving proofs for dividend June 17th. Trustee, Mr. F. C. Ormrod, 12, Lonsdale Street, Stoke-on-Trent, Official Receiver.

G. E. Hewett, radio dealer and electrical engineer, 107, Kenton Road, Harrow, Middlesex.—Receiving order made June 1st on a creditor's petition. First meeting June 14th and public examination July 15th, both at Carey Street, W.C.2.

G. Howarth, radio engineer, 36, Union Street, Bury.—Receiving order made June 1st on debtor's own petition.

W. Smith and **A. G. Smith** (W. Smith & Son), radio and electrical engineers, 23, Crescent Street, Weymouth.—Receiving order made May 31st on debtor's own petition.

J. L. Gottlieb, wireless manufacturer, 28, Ranulf Road, Hampstead.—Trustee, Mr. W. S. Hood, Carey Street, W.C.2, Official Receiver, released May 27th.

C. G. Crowther, radio electrician, 92A, King Cross Street, Halifax.—Trustee, Mr. W. F. Cresswell, 71, Manningham Lane, Bradford, Official Receiver, released May 25th.

W. Hodge, electrical engineer, 3, Saltash Street, Plymouth.—Trustee, Mr. W. A. J. Osborne, Balfour House, Finsbury Pavement, E.C., released April 15th.

Company Liquidations

Hendersons Wholesale Electrical & Radio, Ltd., London, Brighton, and Tunbridge Wells, radio and electrical factors.—The statutory meeting of creditors was held on June 1st at the offices of Lucas Warley and Lucas, Strand, W.C.2, when Mr. Phelp, a director of the company, presided, and said that the shareholders had passed resolutions nominating Mr. B. C. Lucas as liquidator of the company. A statement of affairs was submitted as at April 26th last, the date of the appointment of the receiver for the debenture holders, which disclosed liabilities of £20,176, all due to unsecured creditors. In addition, the bank was a fully secured creditor holding a debenture with interest accrued amounting to £7,927. The net assets were £5,692, leaving a deficiency of £14,484. The company was formed on April 19th, 1934, with a nominal capital of £10,000, and took over a business which had been carried on privately. The vendors were issued shares amounting to £6,777. The assets taken over at that date totalled £9,188, and the liabilities were £1,500, leaving a balance of £7,677. The bank recalled a loan of £10,000 on March 23rd last, and on April 26th they appointed a receiver. The first accounts to May 14th, 1936, showed a profit of £569, after allowing for directors' fees of £1,793. For the trading period to April 26th, 1937, there was a loss of £8,539. It was stated that an offer had been received of £13,500 for the whole of the assets of the company, with the exception of the cash, and that offer was open until three days after the meeting of creditors. The meeting agreed to accept the offer and confirmed the voluntary liquidation of the company, with Mr. B. C. Lucas as liquidator. A committee of inspection consisting of the representatives of the three largest creditors was also appointed. The following are creditors:—British Thomson-Houston Co., Ltd., £476; J. A. Crabtree & Co., £306; Decca Gramophone Co., £289; Ferranti, Ltd., £2,497; General Electric Co., Ltd., £2,864; Lucas Warley & Lucas, £766; Marconiphone Co., Ltd., £2,926; Midland Electric Manufacturing Co., £225; Radio Gramophone Development Co., Ltd., £643; Simplex Electric Co., £729; Ultra Electric, Ltd., £354; United Electric Co., £618.

[Mr. D. G. E. Barrie, late director of Hendersons Wholesale Electrical & Radio, Ltd., asks us to inform his friends that his private address is 24, Middleton Avenue, Hove. Telephone: Portslade 9561.]

Radio and Electrical Supplies (Western), Ltd., 21, Station Road, Llanelly.—The statutory meeting of creditors was held on June 2nd at Llanelly, Mr. W. Jones, managing director, presiding. The statement of affairs showed liabilities of £1,228. The net assets were £169, leaving a deficiency, so far as the creditors were concerned, of £1,059. The creditors decided to confirm the voluntary liquidation of the company, with Mr. G. M. Davies, of Messrs. Clarke, Dovey & Co., Swansea, as liquidator, with a committee.

Radio (Hove), Ltd.—Meetings July 6th at 103, Cannon Street, E.C.4, to receive an account of the winding-up by the liquidator, Mr. A. C. Gillman.

Psychon Radio, Ltd.—Winding up voluntarily. Liquidator, Mr. C. Latham, 185-188, High Holborn, W.C.1.

Wireless Engineering Co. (Scunthorpe), Ltd—Particulars of claims by June 30th to the liquidator, Mr. F. E. Bendall, 1, George Street, Sheffield.

Electric Lighting for Works and Offices

A SPECIAL E.L.M.A. course on electric lighting for works and office executives was held at the Lighting Service Bureau on May 25th and 26th.

Opening the proceedings, Mr. J. W. Beauchamp, commercial manager to the Central Electricity Board, said that good lighting had a deeper significance to factory and office workers than the fact that it made greater accuracy possible, and this was an increased pride in their work and surroundings. Referring to the economics of lighting, he expressed the opinion that not more than 50 per cent. of the offices in this country had adequate lighting, and not even 10 per cent. of those had good lighting systems.

Mr. W. J. Jones, manager of the Lighting Service Bureau, who spoke on "Light-Sight—the Partnership of Vision," explained the reason for the existence of the Bureau. He expressed the hope that all factory and office executives would do their utmost to ensure good lighting conditions for their staffs, and compared the lighting values obtainable in daylight with the value at present in use.

The second lecture, dealing with practical methods of lighting control, was given by Mr. A. D. S. Atkinson, who dealt in detail with the properties of the various materials on the market, emphasising the importance of purchasing the best lighting equipment. Speaking in the afternoon, Mr. E. B. Sawyer said that wherever special lighting problems occurred, the expert lighting man should be consulted.

The last lecture of the day was given by Mr. R. O. Ackerley, who spoke on modern industrial lighting with special reference to electric-discharge lamps. He pointed out the necessity for good lighting in works, not only from the aspect of increased production and cheerful atmosphere, but also from the point of view of supervision.

The following morning was devoted to the installation and production of light, the former being dealt with by Mr. R. Petwin, who, by means of large-scale plans, explained how illumination schemes could be designed on paper to produce good results in practice. Dr. A. B. Whitworth explained the intricacies of lamp construction.

Mr. H. Lingard, deputy manager of the Bureau, said that floodlighting was one of the most progressive branches of the lighting subjects, new uses for it being found almost continuously. He analysed the characteristics of modern floodlighting equipment, calling special attention to the refinements which had been added to projectors during the last few years. He indicated the advantages of floodlighting as compared with other systems of lighting for such problems as excavation work, building construction, shipyards, railway yards, docks, etc.

The last lecture of the conference was given by Mr. J. W. Howell, who dealt with the special problems encountered in factories and offices. He emphasised that early consultation between the illuminating engineer and the factory executive would often save time and unnecessary expense. Each of the lectures was followed by an interesting discussion.

Electricity Supply

Lighting, Domestic, Power

Aspull.—OVERHEAD LINES.—A plan submitted by the Lancashire Electric Power Co. for the extension of overhead low-voltage mains in Withington Lane has been passed by the Urban District Council, which has, however, requested the company to give consideration to the laying of underground cables.

Ayrshire.—DISTRIBUTION.—The Ayrshire Electricity Board is to extend its distribution system to Colmonell and Ballantrae.

Berwick (Northumberland).—EXTENSIONS.—The Scottish Southern Electric Supply Co., Ltd., proposes to erect a sub-station on the Spittal Hall estate. The company also intends to lay cables in Marygate, Church Street and Hide Hill.

Bexhill-on-Sea.—LOAN.—Sanction is being sought by the Urban District Council to borrow £8,336 for various electrical purposes.

Bridgend.—NO MINIMUM CHARGES.—Last week the Urban District Council rescinded a resolution fixing minimum charges for electricity supplies of 5s. for the summer quarters and 10s. for the winter quarters.

CONFIDENCE IN ENGINEER.—A vote of confidence in the Council's electrical engineer, Mr. William Welbury, was passed at the same meeting of the Council, following the report of the recent investigations carried out by Mr. Harold Lawson Murphy, K.C., on behalf of the Ministry of Health, into the administration of the town's electricity undertaking. Serious allegations of bribery and corruption were made at the inquiry against Mr. Welbury by Mr. Trevor David, a former member of the Council, which were not substantiated. The inquiry cost the Council over £1,000.

Burnley.—NEW EQUIPMENT.—Consent has been obtained to the borrowing of £11,197 for expenditure on sub-station buildings, mains, switchgear, &c.

Carlisle.—MAINS EXTENSIONS.—The Electricity Committee is to carry out mains extensions at a cost of £3,913.

Cleethorpes.—ELECTRICAL PROGRESS.—Sales of electricity during the year ended March 31st last increased by 30.8 per cent. to 3,930,000 kWh, reports Mr. B. S. Lord, the borough electrical engineer and manager. The maximum demand was 1,663 kW (against 1,477 kW) and the load factor 28.7 (25.2) per cent. Electricity was purchased in bulk from the Grimsby Corporation at an average price of 0.656d. (0.711d. in 1935-36), and it was possible to make further reductions in tariffs, with a promise of others to come. The net increase in domestic apparatus let out on hire or hire-purchase terms was 278, while 57 additional electric street-lighting units were put into service.

Colchester.—STREET LIGHTING.—Various schemes for improving the street lighting were decided upon at a recent meeting of the Lighting Committee, sodium electric-discharge lamps being specified in each case. It was reported that the Colchester Gas Co. had suggested that it should be permitted to erect modern gas lamps in a number of streets, but having regard to the Council's policy to use electricity for street lighting wherever possible the committee did not consider any good purpose would be served by acceding to the application.

CHANGE-OVER.—It is proposed to change over the system of supply in the neighbourhood of Butt Road and Maldon Road at a cost of £5,653.

Crewe.—LOANS.—Sanction has been obtained by the Town Council to a loan of £25,594 in respect of expenditure on unspecified works, and it is to apply for permission to borrow £15,000 for capital expenditure on mains and services, sub-stations, and equipment.

STREET LIGHTING.—An agreement with the Wistaston Council has been concluded for the provision and lighting of nine additional lamps.

Dover.—TWO-PART TARIFF.—It is proposed to introduce a two-part tariff on October 1st next instead of April 1st, 1938. The fixed charges are to be computed on the house-measurement basis.

Dumfries.—EQUIPMENT CHEAPER TO HIRE.—The Electricity Department is reducing the quarterly hire charges for domestic apparatus as follows: Cookers, medium size, from 6s. to 5s.; large size, from 8s. 6d. to 7s. 6d. Reductions are also being made in the hire charges for water heaters.

Eastbourne.—SUPPLY AT POLEGATE.—The Electricity Committee is to provide supply to the Drayco estate, Polegate, at a cost of £5,145.

Eccles.—STREET LIGHTING.—In connection with the extension of electric-discharge lighting along Liverpool Road and Worsley Road the Electricity Committee has obtained permission to borrow £2,388.

Finchley.—LOAN.—Permission is being sought by the Electricity Committee to borrow £30,000 for consumers' apparatus and wiring installations.

PURCHASING CONSUMERS' COOKERS.—The Committee has had under consideration the question of purchasing privately owned electric cookers from persons desiring to avail themselves of the domestic tariff, which includes the loan, free of charge, of a cooker, and also the issuing of associated equipment to persons owning electric cookers. It is proposed that in the event of any consumer desiring to change over to the domestic tariff the borough electrical engineer and manager shall be authorised to purchase any electric cooker owned by such consumer at a figure to be agreed, providing no payment exceeds the cost of the smallest cooker issued by the Corporation in connection with the tariff.

DISTRIBUTION SCHEME.—A new a.c. distribution network operating from a sub-station which it is proposed to establish in Summers Lane is to be provided by the Electricity Committee, which is also to change over the installations in 400 houses on the Woodhouse housing estate at an estimated cost of £8,105.

France.—NEW HIGH-VOLTAGE TRANSMISSION LINES.—The Compagnie d'Interconnexion Centre-Est, of Paris, has recently been authorised to proceed with the erection of transmission lines between the power station at Chalon-sur-Saône, in the Saône-et-Loire Department, and a transforming station at Palente (Doubs), a distance of about 82 miles. The new lines, which will have a transmitting capacity of 55,000 kVA, are intended to form part of a scheme to supply hydro-electric power to the area near the north-eastern frontier of France.

Guildford.—STREET LIGHTING.—The Town Council is to apply for sanction to borrow £1,000 for street lighting.

Hazel Grove and Bramhall.—SALE OF PORTION OF UNDERTAKING.—It was recently reported to the Electricity Committee that the sum of £7,800 had been received in connection with the purchase by the Stockport Corporation of that part of the Hazel Grove electricity undertaking in the area ceded under the Stockport Extension Act.

Ilford.—SUPPLY ORDER.—A Special Order has been obtained by the Electricity Committee enabling it to provide a supply of electricity to certain premises in Wanstead and Woodford.

Leeds.—PRISON IMPROVEMENTS.—Details of improvements being carried out at Leeds Prison, Armley, are given in the *Yorkshire Observer*. It is stated that gas lighting is being replaced by electric lighting, while during the past year the rebuilding and re-equipment of the kitchen has been completed, electric cookers being installed in place of the gas ovens.

London.—ST. MARYLEBONE.—Sanction has been obtained by the Electricity Committee to borrow £7,876 for mains and £17,382 for switchgear and transformers.

FULHAM.—Details of the quantity of coal carried by the Council's colliers and the costs incurred during the year ended March 31st last have been supplied to the Electricity Committee by the borough treasurer. The tonnage is given as 107,216 and the actual cost, after crediting profit from chartering out, as £10,871, or 2s. 0.3d. per ton. The cost which would

The stands of Siemens Electric Lamps and Supplies, Ltd., and the British Thomson-Houston Co., Ltd., at the I.M.E.A. exhibition

have resulted had loan charges been incurred for the full period during which the colliers were running is stated to be equal to 2s. 4.67d. per ton, and on the same basis, but excluding profit from chartering out, to be 2s. 8.4d. per ton. Original estimates were based on a cost of 2s. 8d. per ton.

In the year ended March 31st last, sales of electricity increased by 4.1 million kWh (12.55 per cent.) to 36.7 million kWh.

In connection with the main recirculating pumps on the sulphur extraction plant, two auxiliary pumps are used for the purpose of providing sealing water for the glands and internal bearings of the main pumps, one pump being used as a standby. At present the sealing pumps are controlled by hand-operated starters, and occasions have arisen when the running pump has been shut down owing either to a failure of the supply of that particular circuit or for other reasons. If this shut down is not immediately noticed and the spare pump started up at once, there is a risk of damage to the glands and bearings of the main pumps. This defect could be overcome by the use of automatic starters which would come into operation immediately the water pressure on the delivery side of the sealing pumps falls below a predetermined figure, and it is proposed to make arrangements accordingly.

With regard to the third stage of the reorganisation of the distribution system it is necessary, in order to make adequate provision for next winter's load, to re-equip the Hurlingham and May Street sub-stations. The estimated cost of this work amounts to £10,043.

The borough electrical engineer has informed the Electricity Committee that in view of the large amount of oil to be maintained in the new switchgear and transformers installed in connection with the reorganisation of the distribution system, it is desirable that a suitable oil filtration and storage plant should be provided. It is proposed that this should be installed at the central sub-station, where it would form a common oil treatment plant for the whole of the distribution side of the undertaking.

Manchester.—SITE FOR POWER STATION.—The Electricity Committee is negotiating for the acquisition of land at Carrington as a site for a proposed power station, estimated to cost more than £2,000,000.

Newbury.—LOAN.—The Town Council is applying for sanction to borrow £12,000 for mains, services, meters, &c.

Newcastle-on-Tyne.—ILLUMINATED BELISHA BEACONS.—The City Council has adopted a scheme for illuminating the 171 Belisha beacons throughout the city. It is understood that Newcastle is the first city in the country to decide on this step. The majority of the beacons will be illuminated by 15-W electric lamps inside the coloured globes, the remainder being lighted by gas.

Peterborough.—CINEMA SUPPLIES.—The charge for electricity supplied to cinemas and theatres has been altered to a flat rate of 1½d. per kWh for lighting and power.

MAINS AND SERVICES.—Sanction is to be sought to a loan of £15,000 for electric mains and services.

Plymouth.—EXTENSIONS.—The Electricity Committee is to extend its mains at a cost of £3,300.

Plympton.—SUPPLY TO IVYBRIDGE.—A special meeting of the Rural District Council last week decided in favour of the Council supplying electricity to Ivybridge, which was added to the Plympton district under the Devon Review Order. It was stated that the basis of compensation for the Ivybridge undertaking could not be discussed at that meeting. A high-voltage main will be provided from Plympton through Sparkwell and Lutton to a sub-station at Ivybridge.

Rawtenstall.—LOAN.—Application is to be made by the Town Council for permission to borrow £32,750 for mains extensions, services, and high-voltage feeders.

Shipley.—SUPPLY TO TRAMWAY SYSTEM.—Sanction has been obtained to a loan of £3,507 for works required in connection with the supply of electricity to the tramway system.

Shrewsbury.—MAINS.—Consent has been received by the Town Council to a loan of £13,601 for extension of mains.

Todmorden.—METERS.—The Town Council has received sanction to borrow £3,000 for meters.

Tottenham.—ELECTRIC-DISCHARGE LIGHTING.—Having been notified by the London Passenger Transport Board of its intention to reconstruct the overhead equipment in Green Lanes in connection with the introduction of trolley-bus services, the Highway Committee has ascertained the terms

Local Authorities and the Distribution Proposals

LOCAL authorities in Durham, Northumberland and North Yorkshire sent representatives to a conference at Sunderland on Tuesday to consider their position in view of the proposals for the grouping of electricity undertakings. Under these proposals the municipal undertakings of Sunderland and Darlington and the Dunston station of the North-Eastern Electric Supply Co. would handle the entire distribution of electricity for Northumberland, Durham and North Yorkshire. This would involve the extinction of all the smaller undertakings and the taking over of their areas of supply. It was to give these smaller undertakings an opportunity of reviewing the position that the Mayor of Sunderland (Ald. Summerbell) called the conference. More than thirty authorities accepted the invitation to attend. Sunderland Corporation Electricity Committee is sending a deputation to London to seek an extension of the undertaking's area of supply under the grouping scheme. One suggestion is that the area should be extended to include portions recently added to the borough, another that areas adjacent to the borough should also be included.

At its recent meeting the Ilkley Urban District Council confirmed a decision of the Electricity Committee to send a communication to the Minister of Transport, the Electricity Commissioners, and the Member of Parliament for the Pudsey and Otley Division giving the views of the Council on certain matters mentioned in the memorandum issued by the Ministry of Transport. It also approved three resolutions passed by the Committee. The first expressed the Committee's inability to understand why so much secrecy had been observed in connection with a matter vitally affecting the interests of local authorities and members of the public. The second was a protest against the refusal of the Minister of Transport to publish the evidence given before the Committee on Electricity Distribution and against local authorities not being able to discuss openly the legislative proposals which had been submitted confidentially. In the third it protested against the view apparently held by members of the Committee on Electricity Distribution that the larger electricity undertakings were the more efficient and against recommendations in the Report which might result in the compulsory transfer of small to large undertakings, irrespective of the efficiency of the small undertakings.

Grave concern is felt by the Middlesbrough Electricity Committee, which has passed a resolution strongly deprecating the proposals in the Ministry of Transport's memorandum envisaging the setting up of large distributing authorities which would be beyond the control of local authorities. This is to be sent to the Prime Minister, the Minister of Health, the Minister of Transport and the local Members of Parliament.

When the memorandum was recently considered by the Dover Corporation Electricity Committee the town clerk stated that the Association of Municipal Corporations had already made representations to the Minister with regard to the McGowan Report, urging *inter alia* that no local authority should be required to part with its undertaking unless it was shown conclusively that the consumers in its area would thereby derive a definite and substantial benefit, and unless that object could not be obtained by any alternative method; that the terms of purchase should be the same for company and local authority undertakings; and that if a local authority received a sum on the sale of its undertaking exceeding the amount of its outstanding debt it should not be bound to apply the surplus to the benefit of consumers of the acquiring authority. The town clerk was instructed to inform the Association of Municipal Corporations and the Incorporated Municipal Electrical Association that the Electricity Committee still concurred in the representations previously submitted by the former Association, and to suggest to the Kent Boroughs and Urban District Councils Association that it should call a conference of local authorities owning electricity undertakings in Group 48A to discuss the matter.

After referring to certain detrimental points in the memorandum, Ald. W. Harvey, chairman of the Electricity Committee of the Guildford Town Council, said it was his opinion that this was a genuine attempt to form areas of distribution which could be worked more economically than the present areas. Naturally, with the growth that the electricity undertakings of the country had experienced some districts were being served by several bodies, whose boundaries intermeshed in such a way that the distribution was uneconomical. The proposals were more or less tentative. He thought that the eventual decision would be on the basis of the greatest good of the whole area concerned.

Hackney Borough Council has set up a special committee to deal with all matters arising out of the proposals.

Ashford (Kent) Urban District Council considers that the proposals would not benefit consumers in its area.

A conference was held at the Guildhall, Hull, on Monday, when the Bridlington, Scarborough, Whitby and Hull undertakings were represented. The Hull Corporation Electricity Committee has reaffirmed its opinion that from the standpoint of the interests of the users of electricity the supply should be under public control. It is opposed to the absorption of public by private undertakings.

In a statement on Tuesday on behalf of London Labour municipal councillors Mr. Herbert Morrison expressed opposition to the proposals. He stated that the conclusion reached at meetings of representatives of Municipal Labour Parties in London was that while they were prepared to consider a comprehensive national scheme they were opposed to the proposals on various grounds. The scheme, by setting up or preserving differing and conflicting types of organisation added to, rather than reduced, the complications; it was contrary to the interests of consumers in that it perpetuated and increased private profit-making monopolies in an industry which should be conducted as a public service; it favoured private companies against municipal undertakings; and the terms of compensation were inequitable in that a company absorbed by a municipality was to be compensated on a much more generous basis than in the reverse case.

of the North Metropolitan Electric Power Supply Co. for improving the street lighting. It is proposed to install electric-discharge lamps, the work to be carried out, if possible, simultaneously with the reconstruction of the traction overhead equipment.

Turton.—BETTER LIGHTING.—A permanent improvement of public lighting to celebrate the Coronation, by means of sodium electric-discharge lamps, is being considered by the Council.

Wallsend.—CABLES.—The North-Eastern Electric Supply Co., Ltd., proposes to lay cables in St. Peter's Road and on the new estate east of Kings Road.

Worthing.—SUPPLY TO ESTATE.—Terms have been arranged between the Electricity Committee and the builder for a supply of electricity to be provided to houses now in course of erection on the West Kingston estate.

York.—EXTENSION OF SUPPLY.—An application has been received by the Electricity Committee for a supply to Howsham Hall and Howsham Village, which are situated outside the York Corporation's statutory area of supply, but no objection is raised to the request being complied with, and the committee therefore proposes to proceed with the scheme.

Traction

Belgium. — RAILWAY ELECTRIFICATION COMMISSION. — The Société Nationale des Chemins de Fer Belges announces that the Minister of Transport has appointed a special commission entrusted with the technical and financial investigation of the electrification of the lines radiating from the capital.

Bradford.—TROLLEY-BUSES.—The substitution of trolley-buses for the trams on the Crossflatts section at a cost of £115,303 is recommended by the Transport Committee.

Cleethorpes and Walsall.—UNOPPOSED TRANSPORT BILLS.—The Select Committee of the House of Commons on Unopposed Bills last week considered two Bills providing for the extension of trolley-vehicle services. One was promoted by Cleethorpes Corporation, who sought authorisation for two new routes, one of which is partly in Grimsby, the Corporation of that town assenting to it. The other was a Walsall Corporation Bill and authorises four new routes in the borough. Both Bills were approved by the Committee and ordered to be reported for third reading.

Germany.—HEAVIEST ELECTRIC LOCOMOTIVE.—An electric locomotive claimed to be the heaviest single-unit electric railway engine in the world is now being built in the Reich locomotive factory at Munich. It weighs 102 tons, has four traction wheels and two idlers on each rail. At 15 kV it will develop 6,000 h.p. and will pull seventeen coaches at a maximum speed of 100 m.p.h. Four of these electric locomotives will soon be put into service on the 1,500 miles of electrified railway lines in Bavaria.—*Reuter.*

London.—NEW TROLLEY-BUS SERVICES.—Fifteen miles of route between Chingford Mount, West Ham, and Victoria and Albert Docks was affected by a change over from trams to trolley-buses on the system of the London Passenger Transport Board last Sunday. Eighty-five trolley-buses, with carbon shoes instead of wheels on the trolley arms, replaced seventy-eight trams.

OPPOSITION TO "TUBE" EXTENSION.—A Select Committee of the House of Lords has this week had under consideration the London Passenger Transport Board Bill by which it seeks power to convert all its tram services to trolley-bus operation and also to extend the Edgware tube railway to Aldenham. The Bill has already passed the House of Commons. Petitions have now been lodged by the Hertfordshire County Council and the Harrow Urban District Council against the proposed railway extension. Mr. Craig Henderson, K.C., for the Board, said that the new line would be about 2¾ miles long and would cost £815,000, which was possible only because the Board had come into possession of the land through the foresight of its predecessors. The new line was expected to yield 6¼ per cent. on the capital investment.

Manchester.—CHANGE OF TRANSPORT SYSTEM.—A report is to be prepared by Mr. R. Stuart Pilcher, general manager of the Transport Department, on the financial effect of substituting motor- or trolley-bus services for the remaining tramways in the city. Recently the Transport Committee decided to convert the Ashton Old Road and Ashton New Road tramway routes to trolley-bus operation. It is likely that there will be a through trolley-bus service between Manchester and Stalybridge in the near future. Under its recent Act the Transport Committee of the Stalybridge, Hyde, Mossley, and Dukinfield Tramways and Electricity Board is to make arrangements for trolley-buses to operate in Stalybridge as soon as the Manchester Transport Committee has completed its scheme.

Metropolitan Railway.—MISHAP.—Eleven people were slightly injured last week when the last two coaches of a train from Aldgate to Harrow left the rails at the junction with the Inner Circle line at Baker Street and were hit by a crowded City-bound train. It was almost twenty-four hours before normal running was resumed, as cranes could not be used in the tunnel, and the track had to be repaired.

Southern Railway.—INAUGURATION OF NEW ELECTRIFIED SECTION.—The official opening of the new electrified section to Portsmouth will be performed by the Lord Mayor of Portsmouth on Thursday, July 1st.

Communications

Australia.—NEW RADIO STATIONS.—A *Reuter* report from Sydney states that there are now ninety-seven radio stations in Australia. Since last October thirty-five new stations, eight national and twenty-seven commercial, have been opened throughout the country.

Canada.—BROADCASTING DEVELOPMENTS. — The Canadian Broadcasting Commission will have in operation by October two 50-kW radio stations at Vercheres, Quebec, and Hornby, Ontario, as part of the nationally owned system, according to an announcement by Mr. L. J. Brockington, chairman of the board. Mr. Brockington further states, says *Reuter's Trade Service*, that the present privately owned stations will not go beyond the 1-kW mark. The Broadcasting Commission also hopes to be operating on a 12- and 16-hour-a-day basis by October 1st instead of the present basis of six hours. The Commission will relay additional United States, British, and French broadcasts, and it is hoped to have a powerful short-wave station erected next year.

Great Britain.—RELAYING BROADCAST PROGRAMMES.—On June 7th, in the House of Commons, Mr. Graham White asked the Postmaster-General if he was in a position to make any statement with regard to the investigation he is making into the relative merits of different methods of relaying broadcast programmes. Major Tryon said that the investigation of various methods of relaying broadcast programmes by wire was being actively carried on both by means of technical research and by practical experiment. Much work, however, still remained to be done before any definite conclusions could be reached as to the relative merits and costs of the different systems.

RADIO RELAY STATISTICS.—At March 31st, 1937, the total number of subscribers to the 333 relay stations in this country was 250,206, forming a percentage of relay licences to total licences of 3.07. At March 31st, 1936, the 238,271 subscribers (344 stations) represented a percentage of relay licences to total licences of 3.12.

Japan.—RADIO-PHOTO SERVICES.—Test transmissions of photographs by radio have been made between Tokio and London, Berlin, and Los Angeles, and in view of the satisfactory results the Ministry of Communications is planning to operate radio-photo services. The services will begin next June, states a *Reuter* message from Tokio.

Palestine.—TELEPHONY WITH GREECE.—*Reuter* reports from Jerusalem that the first telephone service between Palestine and Greece has been formally inaugurated. Mr. G. H. Webster, O.B.E., Postmaster-General of Palestine, opened the new radio-telephone link by putting through a call from Jerusalem to the Greek Postmaster-General at Athens.

Russia.—SUPPLEMENTARY TELEPHONE LINE.—The Commissariat for Communications is opening a supplementary telephone line between Moscow and Paris, *via* Prague. The step has been necessitated by the congestion on the existing line in connection with the opening of the Paris Exhibition of Arts and Crafts in Modern Life.

South America.—A RADIO-COMMUNICATION CONFERENCE.—The second South American international conference on radio communication is being held this month in Rio de Janeiro. The first conference held in Buenos Aires two years ago resulted in an agreement with regard to radio communication between Argentina, Bolivia, Brazil, Chile, Paraguay, and Uruguay.

Switzerland.—TELEPHONE PROGRESS.—According to *Telephon Rundsprech*, the number of subscribers to the telephone system in Switzerland increased during the past year from 260,895 to 276,046, and the number of instruments in use from 383,289 to 412,324. On the other hand, there was a decline in the total communications per subscriber from 1,067 to 1,006.

Turkey.—RADIO MONOPOLY.—*Reuter* reports, in a message from Ankara, that all radio and television services in Turkey will become the monopoly of the Government if a Bill now before the Great National Assembly is passed. In order to popularise the use of radio throughout Turkey, all imported receivers will be exempt from Customs duty until the construction of Turkish sets is begun. Fines ranging from 25 to 1,000 Turkish pounds (£4-£165) or from one to sixteen months' imprisonment are provided under the Bill for all those using radio transmitters or receivers without the necessary Government permit. In time of war those without permits will be treated as spies guilty of high treason.

United States.—RADIO-TELEPHONE SERVICE FOR SHIPS.—Joint participation in providing American ships operating in the coastal trade and on U.S. inland waters, as well as in trans-ocean trade, with a radio-telephone service, has been agreed upon by the Radiomarine Corporation of America and the American Telephone and Telegraph Co., says *Reuter's Trade Service* from New York. The Bell System (of A.T. & T.) has for some time been supplying a shore service to suitably equipped ships from several stations on both the east and west coasts. Through these stations the marine radio-telephone service has been within the reach of the nearly 19,000,000 Bell and Bell-connected telephones in the United States. The Radiomarine Corporation plans to install suitable equipment aboard ships to connect with other ships and with the existing land stations and others which may be established in the future. Marine telephone coastal stations will be established on the Great Lakes for lake shipping.

Contract Information

Where "Contracts Open" are advertised in our "Official Notices" section the date of the issue is given in parentheses

Contracts Open

Aberdare.—June 14th. U.D.C. Electricity Department. Transformers, e.h.v. switchgear and e.h.v., p.i., l.c. cable. (May 28th.)

Aberdeen.—Governors of Robert Gordon's College. Electrical and heating engineering works for additions and alterations to the junior and secondary schools. J. A. O. Allan, 25, Union Terrace.

Argentina.—BUENOS AIRES.—July 16th. Argentine State Oilfields Directorate. Turbo-generator sets, boiler and auxiliary plant, electrical equipment, &c., for extensions to the power station at Comodoro Rivadavia. (T.Y. 23893/37.)*

Ashford.—Electricity Department. Underground cables for twelve months. (See this issue.)

Australia.—BRISBANE.—July 5th. City Electric Light Co. Relays to replace those existing at four sub-stations. (T.Y. 31392.)* 11,000-V switchgear, &c. (T.Y. 17779/37.)*

August 2nd. One set of h.v., d.c. testing equipment. (T.Y. 17843/37.)*

MELBOURNE.—July 13th. State Electricity Commission. Steel-cored aluminium conductors and sleeves. (T.Y. 23954/37.)*

Beckenham.—June 28th. Borough Council. •Coal. (June 4th.)

Bexley.—June 21st. U.D.C. P.i. underground cables for one year. (May 28th.)

Birmingham.—June 28th. Baths Committee. Electric lighting and power installation, Kingstanding baths. Secretary and commercial manager, Baths Department, Kent Street (deposit £2 2s.).

Bradford.—June 16th. Corporation. Three-phase static transformers. (June 4th.)

Bristol.—June 21st. Health Committee. L.v. underground cables, switchgear &c., at Ham Green Hospital, Pill, and electrical services in a nurses' home and three maternity ward blocks at Southmead Hospital. (May 28th.)

Dewsbury.—June 14th. Electricity Department. 11,000-V metal-clad switchgear. (June 4th.)

Dumfries.—July 6th. Electricity Department. Two 300-kVA transformers. (See this issue.)

Egypt.—CAIRO.—July 5th. Ministry of Public Works. 70-kW d.c. Diesel generating set. (T.Y. 31408.)*

Fife.—County Council. Electrical work at eight schools. G. Sandilands, county master of works, Property and Works Department, County Offices, Wemyssfield, Kirkcaldy (deposit £1 1s.).

Hoylake.—June 28th. U.D.C. Electrically driven borehole pumping plant at Newton pumping station. Water engineer, Town Hall.

Irish Free State.—DUBLIN.—July 31st. Electricity Supply Board. 110-kV and 38-kV switchgear and control equipment. (June 4th.)

Littleborough.—June 15th. U.D.C. Electricity Department. One three-cubicle e.h.v. switchboard, one truck type l.v. switch cubicle, one l.v. metering and neutral panel, and one distribution pillar. (May 28th.)

Liverpool.—June 25th. Corporation. H.v. and l.v. switchgear for static sub-stations during two years. (June 4th.)

London. — WANDSWORTH. — June 28th. Borough Council. Wiring of houses, flats and maisonettes. (May 28th.)

WEST HAM.—July 2nd. Borough Council. Electrical installation at a new Colony for Mental Defectives, South Ockendon. (May 28th.)

Macduff.—June 14th. Town Council. Electric street-lighting equipment. Burgh surveyor (deposit £1 1s.).

Manchester.—June 23rd. Electricity Committee. Twelve months' supply of weldless steel lamp columns and fittings. H. C. Lamb, chief engineer and manager, Electricity Department, Town Hall.

Middlesex.—June 28th. County Council. Electric lighting, power, clocks, bells, wiring to telephone points, and service cables in blocks 11 and 12 at the Chase Farm schools; and lifts at Hillingdon County Hospital and Chase Farm schools. (June 4th.)

Middlesbrough.—June 28th. Electricity Department. Two 600-kVA transformers. (June 4th.)

Middleton.—June 19th. Borough Council. Electric lighting installation at public baths. J. Pollard, borough architect, Town Hall (deposit £2 2s.).

Newcastle-under-Lyme.—June 22nd. Electricity Supply Department. One two-cubicle e.h.v. switchboard, two 250-kVA transformers, and one l.v. metering and neutral panel. (June 4th.)

July 6th. Three-phase 6.6-kV transmission line. (June 4th.)

Newcastle-upon-Tyne.—City Council. Installation of electric lighting in 104 new flats, Bedford Street area. R. G. Roberts, city architect, 18, Cloth Market.

New Zealand.—WELLINGTON.—Public Works Department. September 7th. 5,000-kVA transformer bank. (T.Y. 17784/37.)*

Northern Ireland.—BELFAST.—June 14th. Electricity Committee. Mercury arc rectifier equipment and additions to timber wharf and crane rail siding. (May 28th.)

June 14th. Mental Hospital Committee. Electrically driven direct-coupled centrifugal pump for the Hospital. J. Harper. secretary, Mental Hospital Committee, Purdysburn.

Oldham.—June 21st. Passenger Transport Committee. Electric lighting and power installation at the new Central Bus Garage, Wallshaw Street. (June 4th.)

Portsmouth.—June 28th. Electricity undertaking. Cast-iron sea-water circulating water pipes. (See this issue.)

Preston.—July 6th. Electricity Department. House service type electricity meters, domestic water-heating apparatus, and breakfast cookers. (June 4th.)

Rhondda.—June 26th. Electricity Committee. Three-phase static transformers. (May 28th.)

Rochdale.—June 23rd. Town Council. E.h.v. and l.v. p.i. and l.c. cables for twelve months. F. H. Rudd, engineer, Electric House, Smith Street.

June 23rd. Corporation. Electrical power installations in houses at Spotland Turf Hill and Kilworth Street estates. Borough surveyor, Town Hall.

Sandbach.—June 14th. U.D.C. Electrically driven pumping plant. (June 4th.)

South Africa.—JOHANNESBURG.—July 19th. Railways and Harbours Administration. Twelve electric locomotives with electrical spares and alternative quotations for twenty-two electric locomotives with spares. (T. 2593.)*

July 16th. Union Tender and Supplies Board. Line material. (T.Y. 23958/37.)*

PRETORIA.—June 23rd. City Council. Two 12,000-V switchboards and one accumulator battery. (T.Y. 31398.)* E.h.v., l.v. and telephone cables. (T.Y. 31397.)* Two 500-kVA and three 300-kVA transformers. (T.Y. 31401.)*

July 16th. Public Works Department. Three electric lifts. (T. 17817/37.)*

July 30th. H.v. and l.v. switchgear and a 250-kVA transformer. (T.Y. 17861/57.)*

Shrewsbury.—June 18th. Borough Council. Two 400-g.p.m. electrically driven centrifugal pumps, automatically controlled, and one oil-driven pump, together with appurtenant works. A. W. Ward, borough surveyor, Guildhall, Dogpole.

Spenborough.—June 21st. U.D.C. One 500-kVA transformer and one 11,000-V metal-clad switchboard. (June 4th.)

Tottenham.—June 21st. Education Committee. Electrical installation in the Earlsmead, Seven Sisters and Coleraine Park schools. (June 4th.)

Tyldesley.—June 30th. U.D.C. Three pumps, complete with electric motors, automatic float controlled switchgear, &c., for the pumping station, near Miners' Arms, Astley. F. E. Jones, Council's engineer and surveyor, Town Hall (deposit £2 2s.).

Uruguay.—MONTEVIDEO.—July 19th. State Electricity Supply and Telephones Administration. Bare copper conductors. (T.Y. 31405.)*

August 13th. Fifty-four oil-cooled, 3-phase static transformers (6,000/230 V). (T.Y. 23892/37.)*

Wednesbury.—June 14th. Corporation. Electric wiring, &c., of 368 houses and four houses and shops combined. A. Booth, borough engineer, architect and surveyor, Town Hall (deposit £1 1s.).

West Hartlepool.—June 15th. Borough Council. Twelve months' supply of h.v. and l.v. cables. (May 28th.)

West Riding.—June 14th. Mental Hospitals Board. Three-wire balancer for the generating plant at the Wakefield Mental Hospital and lighting installation at Wadsley Mental Hospital. W. E. H. Burton, architect and engineer to the Board, Mental Hospital, Wakefield.

June 28th. County Council. Electric lighting and heating installation at Mexborough Technical Institute. Education officer, County Hall, Wakefield.

Wimbledon.—June 21st. Corporation. P.i. cables for the period ending March 31st, 1938. (See this issue.)

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* Further particulars from the Department of Overseas Trade (Inquiry Room), 35, Old Queen Street, London, S.W.1.

Contracts Closed

Barrow-in-Furness.—Transport Committee. Accepted. Electric testing set (£160).—C.A.V.-Bosch.

Electricity Committee. Accepted. 10,000-kW turbo-alternator (£38,418).—Vickers-Armstrong, Ltd. Boiler plant (£36,953).—Stirling Boiler Co., Ltd.

Birmingham.—Electricity Committee. Tenders accepted during the period from March 13th to May 20th:—Voltage changing equipment for transformers at Hams Hall power station, Lea Marston and Nechells (Princes) generating station.—Ferranti. Electric cookers.—G.E.C. Circuit-breakers.—Ferguson, Pailin. Boiler unit (No. 13) complete at Hams Hall power station.—International Combustion.

Bo'ness.—Town Council. Accepted. Electric lighting at 80 houses.—Greig Bros.

Bradford.—Library Committee. Recommended. Electrical installation at Commercial Library (£72).—Collinson Bros.

Electricity Committee. Accepted. Switchgear in connection with the reorganisation of the h.v. switchgear at Valley Road power station.—A. Reyrolle & Co.

Cardiff.—Electricity Committee. Accepted. Switchgear (£1,960).—B.T.H. Transformers: Two 800 kVA (£804 each).—Hackbridge Construction Co., Ltd.; one 15,000 kVA (£5,657).—G.E.C. Cable (£2,126 per 1,000 yds.).—Pirelli-General.

Chesterfield.—Town Hall Committee. Accepted. Impulse clock installation at Town Hall (£348).—Gillett & Johnston. Telephone installation (£1,724).—Automatic Telephone & Electric Co.

Electricity Committee. Accepted. Cables (£1,119).—British Insulated Cables.

Dumfries.—Corporation. Accepted. Switchgear, &c., for sub-stations (£548).—J. G. Statter & Co., Ltd.

Dundee.—Town Council. Accepted. Meters.—British Sangamo Co.; Measurement, Ltd. Wash boilers.—Burco, Ltd. Electric cookers.—British National Electrics, Ltd. Water heaters.—Simplex Electric Co. Cooker control units.—Revo Electric Co.

Education Works Committee. Accepted. Electric lighting and clock installation at St. Michael's New Central School (£2,218).—Lowdon Bros. & Co.

Ilford.—Electricity Committee. Recommended. Modifications to transformers at Ley Street works (£365).—Brush Electrical Engineering Co.

Leeds.—Electricity Committee. Accepted. Extension of existing contract for transformers for a further two years.—English Electric Co. Cables.—Henley's (£1,657); B. I. Cables (£1,378); Enfield Cable Works (£2,362); Hackbridge Cable Co. (£2,511).

Liverpool.—Passenger Transport Committee. Recommended. Twenty-four car sets of motor equipment (£430 per car set).—B.T.H.

Electric Power and Lighting Committee. Accepted. Cotton Exchange sub-station: Rectifier equipment (£370).—Electric Construction Co. Two 6,000-V circuit-breakers (£722 each).—Switchgear & Cowans.

London.—ST. MARYLEBONE.—Electricity Committee. Recommended. Cables for three years.—Telegraph Construction and Maintenance Co.; B. I. Cables; Enfield Cable Works.

SOUTHWARK.—Health Committee. Recommended. Internal telephone installation at Health Offices (£345).—Automatic Telephone & Electric Co.

FULHAM.—Electricity and Lighting Committee. Accepted. Power-operated capstans at new power station (£543).—Clarke, Chapman & Co., Ltd. Wiring for capstans (£190).—Malcolm & Allan. Recommended. Oil filtration and storage plant (£848).—Streamline Filter Co. Two switchgear panels in connection with supply to Earl's Court, Ltd. (£424).—English Electric Co.

LEWISHAM.—Housing Committee. Accepted. Electricity installation at premises in Longton Grove (£41).—Kirkdale Electrical Co.

Oldbury.—Education Committee. Accepted. Electrical installation at Camp school (£152).—Keith Lowe.

Peterborough.—City Council. Accepted. Street lighting fittings (£1,766).—Revo Electric Co., Ltd.

Plymouth.—Electricity Committee. Accepted. Cable joint and service boxes.—W. Lucy & Co.; Callender's. Pilot cables.—B. I. Cables.

Salford.—Light, Heat and Power Committee. Accepted. Grit-collecting equipment on the No. 4 boiler at the Agecroft power station (£1,123).—Davidson & Co.

Sheffield.—Sewerage Committee. Accepted. Supplies for Coisley Hill sewage works: Three sets of electrically driven pumping plant (£717).—Wallwin (Pumps), Ltd. Electrically driven crane (£630).—T. Smith & Sons (Rodley). Electrical distant recording flow meters (£295).—Lea Recorder Co.

Southport.—Assistance Committee. Accepted. Electric lighting at assistance offices in Birch Street (£47).—Brooks & South worth.

South Shields.—Town Council. Accepted. Switchgear for the Holborn sub-station (£5,572).—A. Reyrolle & Co.

Electricity Committee. Accepted. Switchgear for Holborn sub-station (£5,572).—A. Reyrolle & Co.

Sunderland.—Town Council. Accepted. Electrical plant at the Borough Mental Hospital (£14,050).—J. Kilpatrick & Son, Ltd.

Wallasey.—Electricity Committee. Accepted. Switchgear for Capitol sub-station (£1,132).—Ferguson, Pailin.

Forthcoming Events

Institution of Electrical Engineers.—Thursday, July 1st. Natural History Museum, South Kensington, S.W. 8.30 p.m. Annual conversazione. Wednesday, July 7th. Institution, London. Conversazione to overseas members.

Transmission Section.—Friday, June 18th, to Monday, June 21st. Visit to Holland.

South Midland Centre.—Thursday, July 8th. Summer meeting. Visit to Pirelli General Cable Works, Ltd., Eastleigh.

Institution of Heating and Ventilating Engineers.—Tuesday, June 22nd. Summer meeting.

Association of Mining Electrical Engineers.—Tuesday, June 22nd, to Saturday, June 26th. Southport. Annual convention.

Electrical Contractors' Association.—Wednesday, June 23rd, to Friday, June 25th. Llandudno. Annual conference.

Municipal Tramways and Transport Association.—June 23rd-24th. Southsea, Portsmouth. Annual conference.

Association of Supervising Electrical Engineers *(London Branch).*—Saturday, June 26th. 2.30 p.m. Visit to the Pinewood Studios, Iver.

Junior Institution of Engineers.—Saturday, June 26th. Summer excursion to Stratford-on-Avon and district.

Royal Sanitary Institute.—July 12-17th. Birmingham. Health Congress.

Our Service Department

EVERY day inquiries of all kinds are received by the Editors, the bulk of them relating to the producers of specified classes of electrical goods. We are able to reply to most of these with the aid of our extensive records, but in a few cases we have to seek the assistance of our readers. This week we have been asked for the names and addresses of manufacturers of the following:—

AUTOGRAP electric pen.

Readers should enclose stamped addressed envelopes when making their inquiries.

Notes

Golf Competition

Mr. G. G. L. Preece (Bruce Peebles & Co.) tells us that there were eighty-two entries for the annual golf competition at the I.M.E.A. Convention for the G. P. Dennis Challenge Trophy in aid of the Benevolent Fund of the I.E.E., played on the course of the East Brighton Golf Club. The results were as follows.—Winner of Trophy and replica and first sweep, Mr. R. G. Widgery (Shipley); second, Mr. T. M. Climie (Falkirk); third, Messrs. W. Foster (Simplex) and E. A. Mills (Hackney). The winners of the sweep kindly gave their winnings to the Fund. In addition to this competition a sweepstake was organised for a set of cut-glass tumblers and jug presented by Mr. G. P. Dennis, of Liverpool, the donor of the Trophy. This was won by Mr. F. S. C. Hinings (B.T.H.). The net result is that a sum of £21 will be sent to the Benevolent Fund.

An A.S.E.E. Conference

A two-day conference of delegates of the Association of Supervising Electrical Engineers from all parts of the British Isles was held last week-end in London, when schemes of national organisation were discussed and opinions exchanged on a number of topics of close interest to the Association and its members. The Conference opened on Saturday and Mr. J. Southern, chairman of the A.S.E.E., presided at the morning and afternoon sessions. At a dinner held in the evening the ladies of the provincial delegates and the executive council members were present. Mr. J. Southern presided and expressed a warm welcome to the delegates and their ladies, to which Mr. J. Thompson (of Leeds) responded. At the Sunday morning session there was again a full attendance and the meeting was presided over by Mr. H. A. Crabtree, B.Sc., vice-chairman of the Association.

Developing Rural Areas

In a written contribution to the discussion on the paper presented by Messrs. V. A. Pask and R. W. Steel on "The Development of Electricity Supply in a Rural Area" (reported in our last issue) Mr. H. W. Clothier suggests that generation at 33 kV might have advantages in supplying rural areas. Referring to the interlock system of discriminating protection on the 11-kV network, he states that this was devised as a substitute for Merz-Price protection, which required more expensive pilots. The majority of faults on overhead lines arise from transient causes, such as birds or lightning surges and generally start as single-phase arcing to earth, the damage being due to the following power arcs involving short-circuits between phases or double-phase faults to earth. The risk of injury to insulation is great unless gaps can be installed set to discharge at impulse voltages below the flash-over or puncture voltage of the insulators of the sub-station plant. A trial is to be made on the Norwich system of a recently developed arc-suppression scheme designed to prevent interruptions of supply to overhead systems.

Television Exhibition

To the uninitiated, television has seemed to "arrive" suddenly, whereas it is actually the outcome of many years of patient research and, more recently, intensive development. This is clearly demonstrated by the exhibition which has been organised by the Science Museum, South Kensington, in conjunction with the B.B.C. and leading manufacturers in order to provide the public with an opportunity to appraise the value of this new form of entertainment. The exhibition will remain open from June 11th to September, and in connection therewith a useful handbook is obtainable from the Museum or H.M. Stationery Office (price 7d. by post.

I.E.E. (North-western) Students Section

The annual summer visit of the North-Western Students' Section of the Institution of Electrical Engineers will take place on June 19th, when the works of Samuel Fox, Ltd., will be visited.

Colliery Illumination

In Mr. J. W. Howell's article on this subject in our issue of May 21st the floodlighted overhead gear of a colliery was illustrated. It was ascribed to Westhoughton whereas actually the gear is at the pit of the Houghton Main Colliery Co., Ltd., near Barnsley.

Appointments Vacant

Head of the electrical engineering department at Chesterfield Technical College.

Two senior male showroom sales assistants, two junior male showroom assistants, one female cookery demonstrator and lecturer and two male outdoor development officers or canvassers for Stretford and District Electricity Board.

Mechanical and electrical supervisors for the Air Ministry.

Meter tester and repairer for Finchley Electricity Department.

Telegraph engineer for the Straits Settlements.

Consumers' engineer for Workington E.S. Department.

Control engineer for Croydon Electricity Department.

Scientific officers for the Air Ministry.

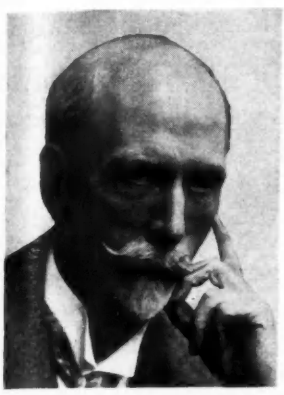
Showroom assistant for Barrow-in-Furness Electricity Department.

(See our classified advertisements.)

Our Personal Column

Electrical men are invited to keep readers of the "Electrical Review" posted concerning their movements

MR. **E. F. J. Holcombe Hewlett,** electrical engineer to the Mansfield Corporation, is retiring from that position on June 30th. His services are being retained by the Corporation, however, in an advisory capacity at a salary of £400 per annum.



[Lafayette
Mr. E. F. J. Holcombe Hewlett

Mr. A. Monkhouse, states *A.E.I. News*, has been released from his other Met.-Vick activities in order to spend most of his time in developing the Electro-Horticultural Equipment Co., Ltd., which has been formed to manufacture electric heating, lighting and soil-pasteurisation equipment.

Mr. H. N. Sporborg, director and chief engineer of the British Thomson-Houston Co., Ltd., and **Mr. G. Hurford,** assistant to the general technical director of the International Standard Electric Corporation, have been appointed vice-presidents of the Works Management Association.

Mr. L. B. Hutton, M.C., M.I.E.E., chief engineer to the Southland Electric Power Board, New Zealand, has been appointed to succeed the late Mr. G. Lauchlan as assistant general manager to the Wellington City Corporation Electricity and Tramways Departments. He was president of the New Zealand Electric Supply Authority Engineers' Association for 1935-36.

Mr. B. G. White has been appointed a director of the B.E.T. Electricity Supply Co., in succession to Mr. P. M. Rossdale, who has resigned.

Mr. A. E. L. Chorlton, M.P., has joined the board of Edward Wood & Co., constructional engineers, of Trafford Park, Manchester. Mr. Chorlton is a director of a number of companies and is chairman of the Lancashire Dynamo & Crypto, Ltd.

Mr. J. F. Taylor has resigned from the board of Worthington-Simpson, Ltd.

In studying the Coronation Honours List we overlooked an item in the Diplomatic List stating that the K.B.E. (Civil Division) was awarded to **Mr. Henry Herbert Couzens,** until recently resident in Rio de Janeiro. The new knight is the well-known electrical engineer who, after serving as engineer to several supply undertakings in this country, joined the Hydro-Electric Power Commission of Ontario, and later went to the Rio de Janeiro Tramway, Light & Power Co.

Mr. N. F. T. Saunders, B.Sc., A.M.I.E.E., has been appointed chief engineer at the Willesden Works of Lancashire Dynamo & Crypto, Ltd. Mr. Saunders served an apprenticeship in marine engineering with Alex. Stephen & Sons, of Glasgow, and attended the Royal Technical College on the "sandwich" system. After spending two vacations with the British Thomson-Houston Co., Ltd., at Rugby, he went to the Metropolitan-Vickers Electrical Co., Ltd., at Trafford Park, where he was a member of the motor development section. He then spent five years as chief designer of fractional h.p. machines and appliances at the Witton Works of the General Electric Co., Ltd., followed by two years as chief engineer with H.M.V. Household Appliances, Ltd., at Hayes.

[Whitlock & Sons, Ltd.
Mr. N. F. T. Saunders

A reorganisation of the staff of the Liverpool Electric Supply Department is proposed. According to a report presented to the Liverpool City Council, it is recommended that Mr. H. A. Williams (resident engineer) shall be appointed superintendent engineer of generation at the Clarence Dock power station; Mr. K. M. Fergusson (station superintendent), assistant superintendent of generation, Lister Drive power station; Mr. S. R. Hollway (generating engineer), assistant station superintendent, Clarence Dock; Mr. H. W. Jones (assistant station superintendent), assistant station superintendent, Lister Drive; Mr. A. B. Noel (turbine house superintendent), turbine superintendent, Clarence Dock and Lister Drive; Mr. J. A. Phillips (electrical superintendent), chief electrical superintendent; Mr. C. W. Bostock (senior shift engineer), boiler house superintendent, Clarence Dock and Lister Drive; Mr. H. Berry (senior shift engineer), assistant station superintendent, Clarence Dock; Mr. W. Mayhew (h.t. engineer), assistant superintendent of sub-stations; Mr. A. E. Aird (senior installation engineer), works superintendent; Mr. L. Edwards (h.t. mains engineer), senior mains engineer; Mr. C. L. Eagle (senior distribution engineer), asistant superintendent of distribution; Mr. J. G. Jones, chief mains superintendent; and Mr. S. Lowey (assistant consumers' engineer), consumers' engineer.

Mr. G. E. W. Knowles, B.Sc.(Eng.), who was recently appointed chief engineer and manager to the Settle and District Electricity Co., Ltd., is a native of West Yorkshire and son of Mr. W. C. Knowles, A.M.I.E.E., electrical engineer for the past twenty-five years to the Elland Urban District Council. Mr. G. E. W. Knowles was trained at Halifax Technical College and the London University, and in 1931 joined the Yorkshire Electric Power Co. as a mains assistant. Subsequently, he was engaged on extension work for subsidiary companies in Cumberland, and later went to the North Lincolnshire and Howdenshire Electricity Co. Last July he became distribution engineer to the Settle company, and has been acting engineer and manager since the death of Mr. C. W. Jewell early this year as the result of a motor accident.

Mr. H. Watson-Jones, M.Eng., A.M.I.Mech.E., A.M.I.E.E., has relinquished his position with the Metropolitan-Vickers Electrical Co., Ltd., to take up that of manager of the Birtley Co., Ltd., Durham. Educated at Liverpool College and Liverpool University, Mr. Watson-Jones had his early practical training with the Mersey Docks and Harbour Board and served with the Royal Navy during the war. He has been with the Metropolitan-Vickers Co. since 1923, first as post-graduate apprentice and later on installation work, and in the U.S.A. as the company's liaison engineer for technical developments. His recent work has been on general engineering in connection with contracts for large power stations and power supply for railway electrification.

[Lafayette
Mr. H. Watson-Jones

The Secretary for Mines announces that, on the advice of the Safety in Mines Research Board, he has appointed **Mr. H. T. Foster,** B.Eng., as Chief Mining Engineer to the Board in succession to **Major H. M. Hudspeth,** D.S.O., M.C., M.Sc., who has returned to the Mines Inspectorate as one of H.M. Deputy Chief Inspectors of Mines.

Mr. H. C. Ashworth, A.M.I.E.E., was married on June 3rd to Miss E. A. Thompson, of Newcastle, at Newcastle-on-Tyne. Mr. Ashworth is on the staff of the Portsmouth Corporation Electricity Department and is the eldest son of Mr. J. Ashworth, A.M.I.E.E., of Bolton.

Mr. R. Kullman has been appointed to succeed **Mr. J. S. Carter** (now managing director) as sales manager of Chamberlain and Hookham, Ltd.

Mr. E. J. Shuter has been appointed sales manager and **Mr. D. S. Cargill** provincial sales superintendent of Claude-General Neon Lights, Ltd. Mr. Shuter was formerly provincial sales superintendent of the company, and Mr. Cargill was in charge of "Claudgen" sales activities in the Newcastle-on-Tyne area, a post which he has held since the formation of this compay.

Mr. Johnstone Wright, chief engineer of the Central Electricity Board, is the author of a paper on "The British Grid System," which is being presented at the semicentennial meeting of the Engineering Institute of Canada this month.

Mr. A. P. M. Fleming, director and manager of the Research and Education Departments of the Metropolitan-Vickers Electrical Co., Ltd., has received the honorary degree of D. Eng. of Liverpool University.

Obituary.—The death occurred at Durban on June 1st of **Mr. John Roberts,** M.I.E.E., who for thirty years was borough electrical engineer of Durban. Mr. Roberts retired on superannuation from that position at the end of 1932.

Will.—**Mr. H. A. Couves,** general manager and director of the North Eastern Electric Supply Co., Ltd., left £22,859 with net personalty £20,091.

Financial Section

New Companies. Official Returns of Capital. Debenture Charges. Reports of Electrical Companies. Dividend Announcements. Transactions in Stocks and Shares

New Companies Registered

Farndons Wholesale Electrical Supplies, Ltd.—Private company. Registered June 3rd. Capital, £2,000. Objects: To carry on the business of electrical and mechanical engineers, merchants and manufacturers of and dealers in electrical and mechanical equipment, &c. The directors are: F. Farndon, 28, Ingestre Road, Hall Green, Birmingham; and C. H. Bowers, 519, Walsall Road, Birmingham, 20. Registered office: 109, Colmore Row, Birmingham, 3.

Neon Supplies (Western), Ltd.—Private company. Registered May 31st. Capital, £1,500. Objects: To carry on the business of manufacturers of bent glass tubes for use in connection with neon lighting and other luminous signs, &c. The directors are: J. L. Kelway (managing director), 17, Westfield Park, Redland, Bristol, and W. H. Hannam, 1, Ashley Avenue, Lower Weston, Bath. Secretary: F. S. Deane.

J. R. Dunkley & Co., Ltd.—Private company. Registered June 1st. Capital, £500. Objects: To acquire the business of an electrical and radio contractor, heretofore carried on by J. R. Dunkley, trading as J. R. Dunkley & Co., at 17, Station Street, Huddersfield. The directors are: J. R. Dunkley (permanent managing director), and Mrs. Dunkley, both of 2, Storths Road, Birkby, Huddersfield.

Albert Taylor (Manchester), Ltd.—Private company. Registered June 1st. Capital, £5,000. Objects: To acquire the business of a manufacturer and supplier of electrical and wireless goods and insulating materials now carried on by A. Taylor as John Moores & Co., at Ravald Street Works, Salford. The directors are: A. Taylor, "White Lodge," Gt. Cheetham Street, Higher Broughton, Salford, and G. R. Kinsey, 26, Duckworth Road, Prestwich.

J. W. H. Simmons & Co., Ltd.—Private company. Registered June 1st. Capital, £1,000. Objects: To carry on the business of manufacturers of and dealers in wireless and television sets, accessories and apparatus, &c. The directors are: W. Simmons, 84, Wheelers Lane, Kings Heath, Birmingham, and two others.

Building Trade Engineers, Ltd.—Private company. Registered June 2nd. Capital, £500. Objects: To carry on the business of electricians, heating, lighting and power engineers, &c. The directors are: R. P. Gladstone, 4, Raymond Buildings, W.C.1, and two others. Registered office: 34, Millbank, Westminster, S.W.1.

B. J. & N. Radio & Television Research Laboratories, Ltd.—Private company. Registered May 29th. Capital, £1,000. Objects: To establish research laboratories with a view to the improvement of radio and television apparatus, to manufacture receiving sets, &c. The directors are: W. H. B. Johnson, Thornhill, St. Mary's Road, Long Ditton, Surrey, and W. J. Nobbs, 52, Chandos Road, Cricklewood, N.W.2. Registered office: 145, Ewell Road, Surbiton.

Vosper's Radio (Plymouth), Ltd.—Private company. Registered June 2nd. Capital, £6,000. Objects: To acquire the business carried on by F. L. Vosper at Russell Street, Plymouth, and to carry on the business of manufacturers of and dealers in wireless and television sets and accessories, &c. The directors are: F. L. Vosper, 15, Russell Street, Plymouth, and E. C. Condy, 15, Princess Square, Plymouth.

Alec Vallance, Ltd.—Private company. Registered June 2nd. Capital, £5,000. Objects: To carry on the business of manufacturers of and dealers in wireless and television sets, accessories and apparatus, artificial lighting apparatus, electrical fittings, &c. The directors are: A. F. Vallance (permanent managing director), Scunthorpe, and Mrs. M. E. Vallance, both of 216, Ashby Road, Scunthorpe. Solicitors: Harrop, White, Gamble & Vallance, Mansfield.

Bakewell Electrical Co., Ltd.—Private company. Registered June 2nd. Capital, £2,000. Objects: To carry on the business of electrical contractors and manufacturers, manufacturers of, agents for and dealers in lamps of all kinds, electrical fittings, wireless sets, valves and wireless accessories, &c. The directors are: A. Bakewell (permanent governing director and chairman), 28, Handsworth Road, Sheffield, and Mrs. E. Bradwell, 181, Handsworth Road, Sheffield. Solicitors: Alderson, Son & Dust, 23, Change Alley, Sheffield.

Vestric Lamp Company, Ltd.—Private company. Registered June 2nd. Capital, £3,000. Objects: To carry on the business of manufacturers and sellers of electric lamps and fittings, &c. The permanent directors are: J. A. Cook, 5, Ashleigh Grove, Jesmond, Newcastle-on-Tyne, and three others. Registered office: 31, Ridley Place, Newcastle-on-Tyne.

Electrical & Radio Service (North Cornwall), Ltd.—Private company. Registered June 1st. Capital, £100. Objects: To carry on the business of manufacturers and repairers of and dealers in artificial lighting apparatus, electrical, gas and oil lamps, quartz lamps, reflectors, bells, fires, stoves, television and wireless sets, &c. The directors are: F. J. Mortimore (permanent) and K. A. Mortimore, both of Market Street, Stratton, Cornwall. Solicitors: Gurney & Andrew, Bude.

Returns of Electrical Companies

Trutolife Television Co., Ltd.—The nominal capital has been increased by the addition of £17,000 in £1 shares beyond the registered capital of £3,000.

London & Provincial Electrical Co., Ltd.—W. Carmichel, of 60, Ashbrook Road, Highgate, N.19, who was appointed receiver and manager on May 21st, 1937, under powers contained in debentures dated April 14th, 1937, ceased to act in that capacity on May 31st, 1937.

Sterling Works (Dagenham), Ltd.—The nominal capital has been increased by the addition of £50,000 in £1 ordinary shares beyond the registered capital of £100,000. At December 31st, 1936, Ismay Industries, Ltd., held 45,000 shares, John Ismay & Sons, Ltd., held 50,000 shares, and Braemore Trading Co., Ltd., held 5,000 shares.

W. & A. G. Lambert, Ltd.—Samuel H. Davies, of 1, Warley Croft, Warley, Birmingham, 17, ceased to act as receiver and/or manager on September 29th, 1936. Notice filed June 1st, 1937.

A. E. Chesters, Ltd.—Satisfaction on May 10th, 1937 (a) to the extent of £250 of second charge dated November 3rd, 1932, and registered November 15th, 1932, and (b) in full of mortgage dated October 17th, 1930, and registered October 28th, 1930.

Mortgage on freehold land and premises No. 2, Atherton Street, Wallasey, with fixtures, &c., dated May 25th, 1937, to secure all moneys due or to become due from the company to Midland Bank, Ltd.

Hackbridge Cable Co., Ltd.—Satisfaction to the extent of £50,000 on May 14th, 1937, of series of debentures authorised by resolution dated January 17th, 1929, and registered January 18th, 1929. According to the register of mortgages, the series of debentures registered January 18th, 1929, originally secured £50,000.

Power Centre Co., Ltd.—Debenture charged on the company's undertaking and property, present and future, including uncalled capital, dated May 24th, 1937, to secure £1,000. Holder: Mrs. Hope Pilkington, Eccleston Grange, St. Helens.

Air-Way, Ltd.—Satisfaction in full on May 10th, 1937, of debenture dated June 27th, 1930, and registered July 1st, 1930.

Debenture charged on the company's goodwill, instalment contracts and other assets and property, present and future, including uncalled capital, dated May 10th, 1937, to secure £4,000 and all other sums not exceeding £15,000. Holders: Bankers Commercial Security, Ltd., 29-45, Finsbury Square, E.C.2.

City Notes

Whitehall Electric Investments, Ltd.—Presiding at the annual meeting held on June 3rd the Hon. Clive Pearson (chairman) said that the Athens Piraeus Electricity Co. continued to progress. The number of consumers had increased to over 131,000, and the kWh sold during 1936 amounted to 124,000,000, an increase of nearly 14 per cent. over the previous year. The solution of its exchange difficulties had enabled the company to remove the restrictions on electricity supply and to undertake the programme of capital works necessitated by the growth of the business. This included a 15,000-kW extension of its generating station and the reinforcement and development of its transmission and distribution systems. The Transport Co. showed an improvement over the previous year, but its operations again resulted in a loss. With regard to the Lecrin Company in Spain, which served the province of Almeria, on October 30th last a meeting was held by the workmen at which it was decided to confiscate the business; a committee of five workmen was appointed, the manager's power of attorney was withdrawn, and the undertaking had since been operated by the committee. The group of companies controlled by West of England Investments, Ltd., continued to record steady progress. Sales of electricity, which amounted to over 18,000,000 kWh in 1936, had increased by 19 per cent. in the year, and during the period 1930 to 1936 the kWh sold and the number of consumers had increased threefold. With regard to the report of the McGowan Committee, the companies in providing supplies over a large territory with a relatively sparse population had rendered a valuable public service, and they were ready to discuss with the owners of neighbouring undertakings by what means a complete unification of electricity supply in the area could be achieved.

Hall Telephone Accessories (1928), Ltd., proposes to increase its capital to £500,000 by the creation of 500,000 10s. shares. An issue of 161,280 is being made to shareholders at 11s. each in the proportion of one share for every three held. The proposals to increase the capital will be submitted at a meeting to be held on June 30th, when shareholders will also be asked to sanction an increase in the directors' remuneration from £100 to £500 per annum and that of the chairman from £150 to £750 per annum. In an interim report the directors state that the results obtained justify the maintenance of the interim dividend at 5 per cent., less tax. The company, with the assistance of the Special Areas Commissioners, is engaged in setting up a factory in Dowlais, South Wales, which it is expected will be in production in a few months' time. Government orders have been received which are earmarked to be manufactured there. This extension will entail considerable outlay for new plant and machinery, besides which some additional working capital will be required for financing these orders. In order to meet this position without depleting the liquid resources, the above issue is being made.

Callender's Cable & Construction Co., Ltd., reports a profit for the year ended December 31st of £561,866, as compared with £405,950 in the preceding year. From this are deducted appropriation for depreciation of buildings, plant and machinery, &c., £70,000; transfer to income tax reserve, £30,000; debenture stock interest, £13,500; and dividends on the 6½ per cent. and 7½ per cent. preference stock, £56,000, leaving £392,366, which, with £390,234 brought in, makes £782,600. As we have already announced, the final ordinary dividend is 10 per cent., making 15 per cent., less tax, for the year (same), plus a special cash bonus of 5 per cent. It is proposed to place £160,000 from the profits to reserve, together with £40,000 from renewals account now no longer required, making the reserve account £1,000,000. The report states that during the year large contracts were placed with the company, mostly for heavy underground mains. The general home cable business expanded and gave satisfactory results, to which improvements in plant

and machinery and also in technique of operations, developed by the company's research laboratory, have contributed. The export trade to India increased, and this was also the case in Australia, New Zealand, and South Africa, where the general orders for the cables in which the company specialises, including rubber wires, have improved in the last two years, owing to the extended applications of electricity in these countries. During the year there was satisfactory business in South America and elsewhere in the Western Hemisphere. At the works of the Anchor Cable Co., Ltd., at Leigh (Lancs), the manufacture of all classes of rubber cables has shown a substantial increase. Meeting: June 16th.

The Delhi Electric Supply & Traction Co., Ltd., held its annual meeting on June 1st, when Mr. K. A. Scott-Moncrieff (chairman), who presided, said that 816 new consumers were connected during the year, making the total 16,291. The increase in kWh sold was 37 per cent., and the revenue therefrom increased by 14½ per cent. These figures were influenced by the supply given to the waterworks at a low rate. They had been able to make a reduction in the charges for lighting and fans as from the beginning of this year. With regard to the traction side of the business, 1936 was somewhat better than 1935. Passenger journeys increased by 42½ per cent., but this did not result in a like increase in the gross revenue, which rose by less than 2 per cent. They were taking steps to arrange for the abandonment of that part of their undertaking. The committee appointed to report on electricity supply in Delhi recommended that the supply of electricity for Delhi and New Delhi should be generated at one power station, and while they were in agreement with this proposal there were others which, if adopted, would seriously affect their interests. It was their intention to approach the Government of India in the hope that the committee's proposals might be so modified as to enable them to become parties to the scheme.

The Compania Hispano Americana de Electricidad S.A. (Chade) reports a net profit for 1936 of 28,552,255 gold pesetas, as compared with 21,748.881 gold pesetas in the preceding year. The increase in the net profits is principally due to larger profits made in Europe. The sum proposed to be applied to amortisation amounts to 2,577,077 gold pesetas. On its part the Compania Argentina de Electricidad (Cade), to which company the Chade has transferred its undertaking in Argentina, has placed to its amortisation fund a sum of 30,672,858 pesos, and to its contingent fund a sum of 8,699,712 pesos, a total of 39,372,570 pesos, equivalent to 36,813,354 gold pesetas. It is proposed to pay a final dividend of 30 gold pesetas on each "A," "B" and "C" share and 6 gold pesetas on each "D" and "E" share. Interim dividends of 20 pesos on the "A," "B" and "C" shares and of 4 pesos on the "D" and "E" shares were distributed last December. The production of electrical energy in the power stations of the Cade amounted to 1,177,965,000 kWh in 1936, as against 1,098,825,000 kWh in 1935.

Bruce Peebles & Co. have had under consideration various suggestions for the capitalisation of arrears of preference share dividends. At the annual meeting the following proposals were submitted on behalf of the board:—(a) That all arrears of dividend, cumulative and non-cumulative, on the preference shares, as also, for the future, the additional dividend of 2½ per cent. contingent on profits of each year, should be cancelled. (A preference dividend of 7½ per cent. for the year to December 31st, 1930, has been paid.) (b) That in satisfaction of arrears and rights so cancelled, ordinary shares of £1 each, fully paid, should be issued at the rate of 6s. (equivalent to 30 per cent.) for each £1 preference share; (c) That the provision requiring consent of the preference shareholders to borrowing on security should be cancelled. Various meetings to give effect to these proposals will be held at Edinburgh on June 23rd.

The British Electric Traction Co., Ltd., reports a revenue for the year ended March 31st of £585,673, as compared with £505,246 for the previous year. After deducting general expenses, income tax, &c., and debenture interest, there is a balance of £390,895. It is proposed to pay (as last year) dividends of 6 per cent. on the participating preference stock, 8 per cent. on the preferred ordinary stock and 5 per cent. on the deferred ordinary stock, leaving £212,324. Preference holders are to receive a further 2 per cent., less tax, again making 8 per cent., and it is also proposed to capitalise £59,411, equal to 10 per cent., on the deferred ordinary shares, and to distribute it to deferred ordinary shareholders in fully paid deferred ordinary shares of £1. These shares are to be converted subsequently to deferred ordinary stock.

The B.E.T. Electricity Supply Co. reports a revenue to March 1st of £52,356, as compared with £50,843 for the period from December 8th, 1934, to March 1st, 1936, and a profit of £34,345 (against £29,360), to which is added £5,194 brought in. A dividend at the rate of 3½ per cent. per annum is paid (against 3 per cent.), and £13,422 is carried forward.

Telephone Rentals, Ltd., reports that dividends received from subsidiary and associated companies for the year to May 31st amounted to £112,897 (gross), as compared with £97,802 in the preceding year, which, with sundry investments and interest receivable, makes £114.708. The net profit (subject to tax) is £108.253 (against £93.594), plus £39,101 brought in. General reserve receives £20,000, and the final dividend is 6 per cent., making 10 per cent. for the year (against 8½ per cent.). The balance carried forward is £47,508. The company has under consideration a further offer of shares to members in order to meet the capital outlay entailed by the expansion of the business of the operating companies.

The Ever Ready Co. (Gt. Britain), Ltd., held its annual meeting on June 3rd, when Mr. Magnus Goodfellow (chairman and managing director), who presided, said that the public demand for their goods continued to increase, and all parts of their business and every one serving the company had contributed to the successful year's work. The Continental business had made a marked advance during the year, but exchange restrictions had prevented them from realising the reward for their labour in Germany and Czechoslovakia. The current year's trading had opened very promisingly, and he hoped that next year they would be able to show the progressive results to which they were accustomed.

The Chloride Electrical Storage Co. reports a profit for the year ended March 31st of £432,442, as compared with £426,825 in 1935-36. After deducting depreciation, tax and directors' fees, and adding £72,000 brought in, there is a total of £436,837 available. The final dividend on the "A" and "B" ordinary shares is 5 per cent., plus a bonus of 5 per cent., making 15 per cent. for the year (same), £10,000 is placed to employés' pension fund, £2,000 to benefit fund, and a further £25,000 to the establishment of a pensions fund for employés of subsidiary companies. General reserve receives £150,000, and £84,580 is carried forward. Meeting: June 18th.

The County of London Electric Supply Co.—The subscription list opened on Wednesday last for an issue of £500,000 3¼ per cent. debenture stock (redeemable 1952-72 at £100 per cent.), at 94½ per cent., and 1,000,000 4 per cent. cumulative preference shares of £1 each at 20s. 6d. per share. The new money is required to finance the developments of the company and its associated companies.

Ward & Goldstone, Ltd., report a profit for the year ended March 31st of £55.275, as compared with £50,524 in the preceding year. As announced in our last issue, the final ordinary dividend is at the rate of 10 per cent., less tax, making 15 per cent., plus a bonus of one new share for every ten held (as last year). Taxation reserve receives £2,000 and general reserve £8,000, the balance carried forward being £32,100.

The Electrical Finance & Securities Co. is paying a final dividend of 5 per cent., less tax, and a bonus of 2½ per cent., making 12½ per cent. for the year. This is at the same rate as in the previous year but payable on 75,000 new shares issued in September last.

The Victoria Falls & Transvaal Power Co. has announced a final dividend of 8 per cent., making 12 per cent. for the year (same).

The Electric Construction Co., Ltd., is paying a dividend of 10 per cent., less tax, on the ordinary shares for the year (against 7 per cent.).

Hick, Hargreaves & Co. are paying a final dividend of 3 per cent., making 5 per cent. for the year, and a bonus of 1 per cent.

The General Cable Manufacturing Co. is paying an interim dividend of 6 per cent. (against 5 per cent.).

Turner & Newall, Ltd., are paying an interim dividend of 3¾ per cent. on the ordinary stock (unchanged).

The Calcutta Electric Supply Corporation is issuing 396,229 £1 ordinary shares at par in proportion to existing holdings.

The Kalgoorlie Electric Power & Lighting Corporation reports a profit for 1936 of £26,395, as compared with £26,449 in 1935, to which is added £6,826 brought in. The final ordinary dividend is 4½ per cent., making 7 ½per cent. for the year, and £10,890 is carried forward.

The Lisbon Electric Tramways, Ltd., reports that, after deducting interest charges in connection with the Companhia Carris de Ferro de Lisboa, and the payment of £20,607 interest on and redemption of the debentures of this company, there is a net profit for 1936 of £150,823, as compared with £157,255 in the preceding year, plus £47,628 brought in. General and depreciation reserve receive £65,000, and it is proposed to pay a final ordinary dividend of 4½ per cent., net, making 7½ per cent. for the year (same). A sum of £36,590 is carried forward.

James Keith & Blackman Co. reports a net profit for the year ended March 31st of £50,367, as compared with £30,588 in the preceding year. It is proposed to pay a dividend of 20 per cent on the ordinary shares (against 15 per cent.), to write off £5,000 from land and buildings, and to transfer £10,000 to reserve. The balance carried forward is £13,416, against £10,160 brought in.

Guest, Keen & Nettlefolds report profits for the year ended March 31st of £1,048,727, as compared with £945,445 for 1935-36. It is proposed to pay a final ordinary dividend of 3½ per cent. (against 2½ per cent.), tax free, making 6 per cent. for the year (against 5 per cent.).

The Plessey Co. has declared a dividend for the period from March 25th to June 30th, 1937, on the 5½ per cent. cumulative preference shares.

Stocks and Shares

TUESDAY EVENING.

BUSINESS during the week in Stock Exchange securities as a whole has been restrained and confidence shaken by what has come to be known as the "gold scare." This, following upon the unpleasant reaction to N.D.C., produced a feeling of caution in the minds of public investors. The assurance that the Government have no intention of changing their "gold" policy, led to a better feeling round most of the markets.

The immediate reception of the Government's proposals for the reorganisation of electricity distribution has done nothing to dispel the impression that its provisions are likely to meet with determined opposition from bodies to whom its suggestions will fail to appeal on the ground either of justice or of probable service to the public. Stock Exchange prices of shares in the companies that are affected, are generally lower on the week.

Apprehension would doubtless have been greater but for the feeling that the proposals will not, in their present form, find their way into the Statute Book. Drastic modifications are expected to result from the opposition which is sure to be aroused within the industry. Some people expect, indeed, to see the plan follow N.D.C. into obscurity. It is believed that there will have to be, in any case, a much closer adherence to the McGowan Committee's recommendations; the latter, claimed to be the framework of the new proposals, are deemed to have been recklessly over-ruled at material points.

Remembering that legislation has, previously, been well

disposed towards the industry, the market is astonished at the bureaucratic note which pervades the present plan. Without going into details, it can be said that strong resentment is felt against the machinery and terms suggested for carrying out the amalgamations, transfers and ultimate control.

Consequent upon the issue of the recent Government memorandum, the market for electricity supply shares opened this month on a weak note; during the past week, quotations have sagged further to levels which, in certain cases, attracted a measure of support. Signs are that the fall may have run most of its course. Continuance of selling is regarded as inevitable while Government plans are still in the melting pot. Investment resistance is expected, nevertheless, to be sufficient to maintain share prices. The latter, it is a truism to say, will find their level from the rates of dividend payment. On this question of dividends, market opinion is generally sanguine that reorganisation of the industry would not disturb present distributions. Before the beginning of the decline in prices, yields on electricity supply shares were in the neighbourhood of 3⅞ per cent.; at current prices, the average return is more like 4¾ per cent. Under present conditions, this is regarded as about the right level of yield to expect from ordinary shares of gilt-edged stamp. The sharpest price-falls of the past week have been in Edmundsons, now 40s., and Electrical Finance and Securities; these declines reflect the uncertainty felt as to the position of holding concerns under the new scheme.

Cable and Wireless

Cable and Wireless ordinary stocks have been an unexciting market since formal approval was given to the capital reconstruction scheme, under which the "A" and "B" issues are to be written down and fused into a single ordinary stock. The present price of 25 for the "A" ordinary, which will receive £30 of the new stock for £100 nominal of the old, represents a price of 83 for the former. On the authoritative forecast of a 4 per cent. dividend, this year, on the reduced ordinary capital, a yield of over 4¾ per cent. in indicated from a purchase of the "A" stock. Many observers hold that this prospective return holds speculative attraction for those possessing faith in the future of international trading activity. The "B" ordinary stands at 6½, also, of course, the equivalent of 83 for the new stock. Holders of the preference are standing pat: the price is very steady at 112.

Transport Stocks

The price of London Transport "C" stock, after a brief rally on the resumption of 'bus services, has subsided to 83, which is no better than the recent lowest point. This latest fall denotes the trend of opinion regarding the dividend outlook. With the evaporation of hopes for an improvement in this year's results, the market is obliged to revalue the stock on a lower basis. The price of British Electric Traction deferred follows an erratic course; following publication of the full report, a rally to 1,450 made up part of the previous week's 75 point drop. Tillings, at 62s. 9d., remain flat. Brazilian Tractions, at 24¾, are ex- the latest cash dividend of 50 cents, and show a small improvement on the week. A small offering of Anglo-Argentine Tramways first preference sufficed to lower the price from 7s. to 5s.

Miscellaneous Matters

This week's offer of half a million pounds 3¼ per cent. debenture stock at 94½ and one million 4 per cent. preference shares at 20s. 6d. by the County of London Electric Supply Company aroused no little interest as to what sort of reception the investor would accord to such gilt-edged securities issued, however, at prices that looked tolerably high—these days. Investment prices pursue a somewhat erratic course. British Insulated, Henleys, Johnson and Phillips, and Siemens have modest gains to their credit. Hall's Telephone Accessories at 32s. are 2s. 3d. better on an offer of new shares, at 11s., by way of rights. Enfield Rolling Mills at 18s. 6d. have risen 1s. 9d., on the issue of a good interim report. Enfield Cables hardened to 55s. 8d. Laurence, Scott and Electromotors at 47s. 6d. are 3s. 9d. better. Brush ordinary shed 5 points, going back to 56¼. The iron and steel group is quiet. Babcocks eased off to 48s. 9d. No point of interest has transpired in the rubber market.

New Issues

Among last month's new issues in the electricity supply market, South Wales Electric Power 3½ per cent debentures are on offer now at a fraction below the prospectus price of 98½. The company, a subsidiary of Edmundsons Corporation, earned profits last year sufficient to cover debenture interest four times over: redemption dates are 1947-67. The stock can be bought, free of stamp duty and fee, at 97¾, to yield £3 11s. 6d. on the money. A first payment of 24s. per cent. will be made in December. The Scottish Power Company's offer of a million 4 per cent. £1 preference shares was heavily over-subscribed: issued at par, the shares are changing hands at around 20s. 6d. The return to a buyer of the stamp-free renounced-allotment letters is £3 17s. 6d. per cent.

The new ordinary shares offered, at 30s., to North Somerset Electric ordinary stockholders, command a premium of about 1s. 9d. The old shares have been lowered to 33s. 6d., ex-rights to the offer. West Devon Electric new ordinary, offered to shareholders at 24s., are available in the market at 1s. premium. Dividends of 5 per cent. have been paid for the last two years: on this basis, the return on the new shares is 4 per cent.

Share List of Electrical Companies

	Nom.	Dividend. Previous.	Dividend. Last.	Price. June 8.	Rise or Fall.	Yield p.c. £ s. d.
HOME ELECTRICITY COMPANIES.						
Bournemouth and Poole	1	15	15	70/–	–½	4 5 9
City of London	1	7½	7½	33/6	–1/–	4 9 7
Clyde Valley	1	7	8	40/6	–6d.	3 19 0
County of London	1	10½	10½	47/6	–6d.	4 8 6
Edmundson's 7% Pref.	1	7	7	35/–	—	4 0 0
Do. Ord.	1	8	9	40/–	–2/–	4 10 0
Elec. Dis. Yorkshire	1	9	9	43/–	—	4 3 10
Elec. Fin. and Securities	1	12½	12½	2½	–⅛	4 13 0
Elec. Supply Corporation	1	11	12	54/6	—	4 8 1
Lancs Light and Power	1	7½	7½	33/–	—	4 11 0
Lond. Assoc. Electric	1	—	7	32/3	–1/–	4 6 10
London Electric	1	7	8	35/6	–6d.	4 10 2
London Power Deb. Red.	Stock	5	5	106½	—	4 14 0
Metropolitan	1	10	10	45/6	—	4 9 0
Midland Counties	1	7½	8	37/6	—	4 5 4
Mid. Elec. Power	1	8	9	2	—	4 10 0
North Eastern Electric Ordinary	1	6	7	32/–	—	4 7 6
Do. 7% Pref.	1	7	7	35/–	—	4 0 0
Northampton	1	10	10	47/6	—	4 4 2
Notting Hill 6% Pref.	10	6	6	14xd.	+½	4 5 9
North Met. Elec. Ordinary	1	10	10	47/6	—	4 4 2
Do. do. 6% Pref.	1	6	6	31/0	–6d.	3 17 5
Scottish Power	1	8	8	37/–	—	4 6 6
South London	1	7	7	32/–	—	4 7 6
Whitehall Elec. Invst. 7½% Pref.	1	7½	7½	23/–	—	6 10 0
Yorkshire Elec.	1	8	8	40/6	–6d.	3 19 0
PUBLIC BOARDS.						
Central Electricity, 1950–70	Stock	5	5	114	—	4 7 9
Do. 1955–75	,,	5	5	115½	—	4 6 7
Do. 1951–73	,,	4½	4½	109	–2	4 2 7
Do. 1963–93	,,	—	3½	98	–½	3 11 5
London Elec. Trans. Gtd.	,,	—	2½	91	—	2 15 0
London & Home Counties, 1955–75	,,	4½	4½	110	—	4 1 10
London Passenger Transport, A.	,,	—	4½	116½	—	3 17 3
Do. do. B.	,,	—	5	117½	—	4 5 1
Do. do. C.	,,	4	4	83	–3	4 16 5
West Midlands Joint Elec. 1948–68	,,	—	5	112½	—	4 9 0
TELEGRAPH AND TELEPHONE.						
American Tel. & Tel.	$160	9	9	168½	—	5 6 10
Anglo-Am. Tel. Pref.	Stock	6	6	126½	—	4 15 0
Do. Def.	,,	1½	1½	29	—	5 3 5
Cable & Wireless 5½% Pref.	,,	4½	5½	112	—	4 18 3
Do. A. 7½% Ord.	,,	Nil	Nil	25	—	—
Do. B. Ord.	,,	Nil	Nil	6½	—	—
Globe Tel. & Tel. Ord.	10	3½*	4½*	15½xd.	—	2 18 1
Do. do. Pref.	10	6	6	14xd.	—	4 5 9
Great Northern Tel.	10	20	20	41¾	+¾	4 16 0
Marconi-Marine	1	10	7½	1¾	—	4 5 9
Oriental Telephone Ord.	1	12*	12*	3½	—	3 16 10
HOME AND FOREIGN TRAMS, ETC.						
Anglo-Arg. Trams First Pref.	5	Nil	Nil	5/–	–2/–	—
Do. do. 2nd Pref.	5	Nil	Nil	3/9	—	—
Do. do. 5% Deb.	Stock	Nil	Nil	21½	—	—
British Electric Traction Df. Ord.	,,	5	5	1450	+50	—
Do. do. Pref. Ord.	,,	8	8	165	—	4 15 5
Brazil Traction	$100	40 cts.	50 cts.	24¾	+¾	—
Brit. Columbia Elec. Rly. Pce.	Stock	5	5	105½	—	4 14 9
Mexican Light Common	$100	Nil	Nil	2	—	—
Do. 1st Bonds	$500	5	5	44½	—	—
Victoria Falls Ord.	1	20	12	66/3	+⅛	3 12 6
West Riding	1	6½	10	46/3	—	4 6 6
MANUFACTURING COMPANIES.						
Aron Electricity Ord.	1	10	15	2¾	—	5 9 1
Assoc. Elec. Ord.	1	8	10	47/6	—	4 4 2
Do. Pref.	1	8	8	37/6xd.	—	4 5 3
Babcock & Wilcox	1	8	10	48/9	–⅛	4 2 0
British Aluminium Ord.	1	7½	10	50/–	—	4 0 0
British Insulated Ord.	Stock	20	20	4¾	+⅛	4 6 6
Brush Ord.	Stock	Nil	Nil	56½	–5	—
Callender's	1	15	15	4½xd.	—	3 4 0
Do. 6½% Pref.	1	6½	6½	30/–xd.	+6d.	4 6 8
Crompton Parkinson Ord.	5/–	12½	12½	3xd.	+2d.	—
Do. 8% Pref.	1	8	8	37/6xd.	+6d.	4 5 4
Electric Construction	1	3½	7	37/6	—	3 14 8
Enfield Cable Ord.	1	25	25	5¾	+⅛	4 9 0
English Electric	1	Nil	Nil	33/0	–6d.	—
Do. do. Pref.	1	6½	6½	26/–	—	5 8 4
Ericsson Tel.	5/–	20	25	50/–	—	2 10 0
Ever Ready	5/–	35	45	32/–	—	7 0 10
Ferranti Pref.	1	7	7	27/6	—	5 2 10
G.E.C. Pref.	1	6½	6½	32/6	—	4 0 0
Do. Ord.	1	10	15	83/–	—	3 12 3
Henley's	5/–	30	15	1	+6d.	3 15 0
Do. 4½% Pref.	1	4½	4½	1½	—	4 0 0
India-Rubber Pref.	1	5½	5½	22/6	—	4 17 9
Johnson & Phillips	1	7½	10	42/–	+9d.	4 15 3
Lancashire Dynamo	1	10	20	3⅛	—	6 1 0
Siemens Ord.	1	6	7½	32/6	+⅛	4 12 4
Telegraph Construction	£1	Nil	7½	2⅛	—	3 8 8

* Dividends are paid free of Income Tax.

Published Specifications

Compiled expressly for this journal by a firm of chartered patent agents. The numbers in parentheses are those under which the specifications will be printed and abridged and all subsequent proceedings will be taken.

1934

23609. "Wireless receivers." J. Robinson. October 7th, 1935. (465515.)

1935

22208. "Wireless systems, particularly direction-finding apparatus therefor." Panstwowe Zaklady Tele-I Radjotechniczne W. Warszawie. August 8th, 1934. (465587.)

22438. "Method of and means for controlling the load and/or output of power-generating plant." Sir W. G. Armstrong, Whitworth & Co. (Engineers), Ltd., and A. Orton. August 8th, 1935. (465588.)

25450. "Electrical heating and battery-charging systems." P. G. Caldwell. October 13th, 1936. (465592.)

27280. "Radio-frequency receiving systems." P. D. Tyers. October 3rd, 1935. (465593.)

27578. "Electric resistance alloys." British Driver-Harris Co., Ltd. (J. M. Lohr). October 5th, 1935. (465594.)

27631. "Methods of jointing and of effecting repairs to electric cables." Cablon, Ltd., and S. Chaplin. October 7th, 1935. (465523.)

30936. "Electro-acoustical reproducers." W. W. Groves (Cinaudagraph Corporation). November 8th, 1935. (465795.)

30950. "Direct current electric motor control systems." General Electric Co., Ltd., E. H. Croft and J. C. Turrall. November 8th, 1935. (465726.)

30960. "Telephone system with means for diverting a call from one receiving station to another." Hasler Akt.-Ges. vorm Telegraphen-Werkstatte von G. Hasler. November 17th, 1934. (Cognate applications 30961/35 and 30962/35.) (465604.)

30992. "Electrolytic condensers." Dubilier Condenser Co., (1925), Ltd. November 8th, 1934. (465727.)

31075. "Thermionic valve circuit arrangements." Marconi's Wireless Telegraph Co., Ltd., and N. H. Clough. November 9th, 1935. (465613.)

31077. "Alternating-current electric motors." A. Walsh and Metropolitan-Vickers Electrical Co., Ltd. November 9th, 1935. (465729.)

31165. "Timing mechanism for magneto-electric machines." British Thomson-Houston Co., Ltd., W. E. Gough, J. H. Pollard and W. H. Maycock. November 11th, 1935. (465664.)

31178. "Circuit arrangements for controlling gas or vapour electric-discharge devices." Siemens-Schuckertwerke Akt.-Ges. April 8th, 1935. (465731.)

31329. "Electrolytic processes and apparatus." E. I. Du Pont de Nemours & Co. November 12th, 1934. (465737.)

31424. "Amplifier circuit arrangements." Siemens & Halske Akt.-Ges. November 15th, 1934. (465742.)

31463. "Inductance coils." Telefunken Ges. für Drahtlose Telegraphie. November 13th, 1934. (465746.)

31465. "Variable-inductance and resistance coils." Bliss-Morse Research Corporation. November 13th, 1934. (465747.)

31585. "Scanning discs for television." General Electric Co., Ltd., H. W. B. Gardiner and D. T. Russell. November 14th, 1935. (465790.)

31587. "Method of treating carbonaceous electrode-elements." M. Suzuki. April 11th, 1935. (465791.)

31588. "Wireless receivers for use, for example, in ships or aircraft." R. P. G. Denman. November 14th, 1935. (465792.)

31641. "Control means for electrically operated welding machines." Buckley, Saunders and Co. (Pontelec), Ltd., and P. Buckley. November 15th, 1935. (465806.)

31788. "Electric motor control systems." English Electric Co., Ltd., H. S. Carnegie and A. E. Rogers. November 16th, 1935. (465527.)

31933. "Cooling arrangement for increased output of oil-cooled transformers and similar apparatus." Allmanna Svenska Elektriska Aktiebolaget. February 2nd, 1935. (Cognate application 31894/35.) (465752.)

32162. "Supporting means for luminous electric-discharge tubes." Claude-General Neon Lights, Ltd., and C. Higgins. November 20th, 1935. (465616.)

33207. "Electric transformers, choke coils and similar apparatus." Ionlite, Ltd., and W. A. Stickley. November 29th, 1935. (465619.)

33397. "Electric indicating apparatus, more particularly liquid-level indicators." G. Gilles and H. Lustin. December 3rd, 1934. (Cognate application 33398/35.) (465529.)

1936

792. "Devices, such as electric-discharge tubes and incandescent lamps, of the type comprising an outer vitreous jacket and an inner vitreous envelope within it." General Electric Co., Ltd. (Patent Treuhand-Ges. für Elektrische Glühlampen.) January 9th, 1936. (465628.)

1102. "Method and apparatus for television." P. T. Farnsworth. January 13th, 1936. (465631.)

2116. "Variable-electrical condensers." Stratton and Co., Ltd., and G. S. Laughton. January 23rd, 1936. (465634.)

2210. "Television." Radioakt-Ges. D. S. Loewe. January 25th, 1935. (465755.)

2347. "Cooling tubes for dynamo-electric machines and other like purposes, and methods of manufacturing same." Laurence, Scott and Electro-Motors, Ltd., and P. A. H. Mossay. January 24th, 1936. (465676.)

4422. "Electrical switchgear." G. E. Whitehead and Whitehead's Electrical Inventions, Ltd. February 13th, 1936. (Cognate application, 11767/36.) (465638.)

5752. "Optical systems of scanning devices for television apparatus." E. Traub. February 26th, 1936. (465642.)

7652. "Protecting means for current convertors." Allmanna Svenska Elektriska Aktiebolaget. March 13th, 1935. (465682.)

7888. "Method and apparatus for testing high potential insulation." Siemens and Halske Akt.-Ges. March 15th, 1935. (465761.)

12802. "Electric-discharge devices." British Thomson-Houston Co., Ltd. May 11th, 1935. (465762.)

12902. "Electric batteries and connectors therefor." C. M. R. Balbi. May 7th, 1936. (465689.)

17298. "Telephonic time announcer." R. Brennan. June 22nd, 1936. (465647.)

19787. "Cathode-ray tubes." Naamlooze Vennootschap Philips' Gloeilampenfabrieken. October 14th, 1935. (465763.)

20269. "Electric lamp brackets." H. Schroder. October 19th, 1935. (465699.)

21127. "Measurement of the state of charge or discharge of an electric accumulator." Britannia Batteries, Ltd. October 31st, 1935. (Addition to 438407.) (465648.)

21606. "Internal-combustion engine electric power units." Sulzer Freres Soc. Anon. August 12th, 1935. (465649.)

22613. "Devices for controlling wireless receiving sets." Naamlooze Vennootschap Philips' Gloeilampenfabrieken. August 19th, 1935. (465703.)

23067. "High-frequency oscillation generators." C. Lorenz Akt.-Ges. August 24th, 1935. (465650.)

26778. "Electrolytic devices." British Thomson-Houston Co., Ltd. October 2nd, 1935. (465651.)

27032. "Cathode-ray tube picture-transmitters." Telefunken-Ges. für Drahtlose Telegraphie. October 3rd, 1935. (465715.)

29945. "Telephone systems." Telefonaktiebolaget L. M. Ericsson. November 4th, 1935. (465655.)

30921. "Transmitter devices for facsimile printing telegraph installations." Siemens and Halske Akt.-Ges. November 12th, 1935. (Addition to 459275.) (465573.)

31611. "Electric lamp connectors." British Thomson-Houston Co., Ltd. November 20th, 1935. (465657.)

35311. "Methods of electric welding." British Thomson-Houston Co., Ltd. December 31st, 1935. (465581.)

35608. "Electro-acoustical reproducers." W. W. Groves (Cinaudagraph Corporation). November 8th, 1935. (Divided out of 465795.) (465794.)

Trade Mark Applications

The following are among the recent applications for British trade marks. Objections against any of the proposed marks may be entered within one month from June 2nd:—

Le Carbone (lettering and design). No. 575376. All goods in Class 4. No. 575377. Class 13. Component parts and fittings for electric batteries.—La Société Le Carbone, Gennevilliers, Paris, France. (British representatives: D. Young & Co., 11-12, Southampton Buildings, Chancery Lane, W.C.2.)

Suprex. No. 566717. Class 4. Carbons for electrical purposes.—Charles H. Champion & Co., Ltd., National House, 60-66, Wardour Street, W.1.

Imp. No. 576138. Class 6. Suction-cleaning machines and washing machines.—The British Vacuum Cleaner and Engineering Co., Ltd., Parsons Green Lane, Fulham, S.W.6.

Wolf Electric Tools (lettering and design). No. 575734. Class 6. Portable electrical machine tools for grinding, drilling, sanding, filing, sawing, screwdriving and nut setting.—S. Wolf & Co., Ltd., Pioneer Works, Hanger Lane, Ealing, W.5.

Yorcwyte, W.Y. (lettering and design). No. 576021. Class 6. Metal tubes.—The Yorkshire Copper Works, Ltd., Pontefract Road, Stourton, Leeds.

Ford. No. 574247. Class 8. Wireless telephonic receiving sets for motor vehicles.—The Ford Motor Co., Ltd., 88, Regent Street, W.1.

Maxade. No. 574572. Class 8. Philosophical and scientific instruments and apparatus for useful purposes.—Peto Scott Co., Ltd., 77, City Road, E.C.1.

Inertex. No. 576568. Class 8. Insulated electric cables.—Edison Swan Cables, 155, Charing Cross Road, W.C.2.

Garod (lettering and design). No. 576044. Class 8. Radio receiving sets and parts thereof.—Garod Radio Corporation, New York. (British representatives: Boult, Wade and Tennant, 112, Hatton Garden, E.C.1.)

Testing Insulators in Germany

FOR testing insulators the Hermsdorf Schomburg works, Germany, has installed a new single-pole, 1,000-kV-to-earth transformer. This voltage is obtained in a single step with a primary of 5 kV. The transformer is contained in a single metal case of welded construction, 12 ft. 9½ in. in diameter and 14 ft. 5 in. high, surmounted by an insulator which was made in two sections for facility of manufacture; the two parts are cemented together. The primary of the transformer is divided into two sections; series connection gives a step-up of 5 to 500 kV, while the parallel connection gives the full 1,000 kV. The secondary winding is built with one end permanently connected to earth, while the other comes out through the insulator at the top. A tap is provided in the secondary to permit 1,758 V to be obtained for measuring purposes. In tests at over 800 kV (effective) an over-voltage greater than the flash-over voltage of the lead-out is produced. This may reach 1,200 kV (effective) and to avoid it a protective resistance of 50,000 ohms is cut in between the test piece and the transformer. On account of its size, the transformer had to be assembled in the cell built to house it. This is designed as a pit deep enough to take the whole case of the transformer, so as to leave only the lead-out projecting. The partition wall between the transformer cell and the test room serves also to support the roof of the transformer cell and for this reason the possibility of a wide opening through which to bring the 1,000-kV lead is excluded. The lead is, therefore brought through an opening of oval shape, 19 ft. 8 in. high and 13 ft. 1 in. wide. This allows sufficient distance between the conductor and the top and bottom of the opening, while at the sides protection is afforded by shields made of oiled paper such as is used for the construction of condensers. In order to obtain a sufficiently large sheet, several strips were laid next to each other and the whole made into a solid piece by impregnation with paraffin wax.

New Work for Contractors

Particulars of new works and building schemes for the use of electrical installation contractors and traders

Publication in this list is no guarantee that electrical work is definitely included. Alleged inaccuracies should be reported to the Editors.

Aberdare.—Welfare Hall, for Trecynon and District Welfare Association; E. G. Henton, architect, 45, Monk Street.

Ashington.—Houses (120); U.D.C. surveyor.

Barnard Castle.—Houses (22); C. Pickersgill, architect.

Birmingham.—Houses (180), Lea Hall estate, and civic centre buildings (£344,049); city engineer. Additions to the Beaufort Cinema, Ward End (£20,000); Morris, Jacombs & Son, builders, Hobmoor Road, Birmingham.

Blackpool.—Houses (52), Elaine Avenue; Senior & Sons, builders, 107, Highfield Road, South Shore.

Blyth.—Houses (412) in connection with clearance plan; borough engineer.

Bradford.—Houses (92), Gibson Street; borough surveyor. Central children's homes, Squire Lane (£31,000); city architect. Six shops and houses, Harrogate Road; S. Rhodes.

Buckhaven.—Extensions to Cameron hospital (£75,000), for the Fife Public Health Committee.

Burnley.—Cinema, Church Street; Drury and Gomersall, architects, Imperial Buildings, 11, Oxford Road, Manchester.

Coventry.—Houses (30); J. Ashman & Co. Houses (28), Cheveral Avenue; Philpot Bros. Houses (24), Caludon Castle estate; F. G. Robinson. Houses (81); Bold Building Co., Ltd.

Dagenham.—Houses (50), Crowstone Avenue; S. Roberts. Houses, East Road and Havering Gardens; South Essex Property Co. Houses, Temple Gardens and Crowlands Avenue; J. Blade.

Docking (NORFOLK).—Houses (44); J. H. Marshall, clerk, Council Offices, Station Road.

Doncaster.—Houses (50), Intake estate (£22,489); P. P. Taylor, builders.

Droitwich.—Houses, Dodderill, Ombersley, North Canes, &c.; L. Adams, R.D.C. surveyor.

Edinburgh.—Houses, for the Modern Homes Investment Co., 76, High Street, Dundee; the secretary. Intermediate school, Pelton (£95,000); E. J. McRae, City Chambers, Edinburgh.

Epsom.—Public baths, comprising swimming bath, slipper baths, Turkish bath suite and superintendent's quarters; A. W. S. & K. M. B. Cross, architects, 46, New Bond Street, London, W.1.

Failsworth (MANCHESTER).—Houses, Dean Street site, and Wrigley Head site; J. W. E. Brown, U.D.C. surveyor, Town Hall.

Gateshead-on-Tyne.—Houses (204), Wrekenton, for the North-East Housing Association; Gibson Brothers, builders, Hill Heads, Whitley Bay.

Glasgow.—Factory (£100,000), for the Scottish Cables, Ltd., Shieldhall; H. N. Sporborg, solicitor, 18, Austin Friars, Old Broad Street, London, E.C.2.

Gomersall.—Houses, Oxford Road, Craven Lane, Mufett Lane and Leeds Road; Sydney Smith, builder, School Lane, Dewsbury Moor, Dewsbury.

Gosforth (NORTHUMBERLAND).—Houses (20), for the Aged Miners' Homes Association; H. Kindred, builder, Sunniside, Gateshead-on-Tyne.

Great Yarmouth.—Cinema, Regent Street; A. Dudley Moore.

Hastings.—Senior girls' school, Red Lake, for E.C.

Hitchin.—Houses (36), various sites; A. E. Passingham, clerk, 9, Bancroft, Hitchin.

Hollingbourne.—Houses, Hollingbourne, Tenham, Stockbury, Sutton Valence and Ulcombe; R.D.C. building surveyor, Star House, Maidstone.

Ilford.—Houses (24), Hanover Gardens; Davis Estates, Ltd. Trolley bus depôt, Ley Street; London Passenger Transport Board.

Irish Free State.—(NEWBRIDGE, CO. KILDARE).—Houses (100), Rathfield, for the Kildare Board of Health. Naas; N. O'Dwyer, engineer, Veritas House, Lower Abbey Street, Dublin. (SLIGO).—Houses (132); McDonnell and Dixon, architects, 20, Ely Place, Dublin.

Irthlingborough.—Houses (60), Hayway estate; E. Turnbull, U.D.C. surveyor, High Street.

Isle of Wight.—Extensions to Freshwater, Rockley and Shorwell schools, for E.C.

Kettering.—Cinema, Russell Street (£25,000); J. Sherwood, Netherfield Road.

Knutsford.—Houses (24), Warren Avenue estate; Franklin & Fryer, Ltd., builders.

Lanarkshire.—R.C. school, Baillieston (£38,000); architect, County Council, Hamilton.

Lancashire.—Extensions to High School for Girls, Fairfield, and county branch library and lecture hall, Thornton, for C.C.; S. Wilkinson, county architect, County Offices, Preston.

Lanchester (DURHAM).—Hospital (£160,000), for the Lanchester Joint Hospital Board; W. & T. R. Milburn, architects. Fawcett Street, Sunderland.

Liverpool.—Houses (73) and shops; Milton Estates, Ltd., Wavertree. Cinema, Lower House Lane; L. A. G. Pritchard, architect. Philharmonic hall (£95,787), with electrical work; Morrison & Son, Ltd., builders, Grange Terrace.

Llandilo.—Factory, Fairfach, for the Co-operative Wholesale Society, Ltd.

London.—(DEPTFORD).—Cinema, Broadway; G. Coles, 40, Craven Street, W.C.2.

Luton.—Houses (30), Hart Lane site; David Nott, builder, Luton. Houses (80), Turners Road; C. C. Smith. Houses (125); H. C. Janes, Ltd. Houses (42), Preston Gardens; F. P. Press.

Maesteg (GLAMORGAN).—Houses (68), Park site (£23,867); U.D.C. surveyor.

Maidstone.—Public baths, comprising swimming bath, dressing rooms, cleansing rooms, &c.; A. W. S. and K. M. B. Cross, architects, 46, New Bond Street, London, W.1.

Manchester.—Factory, Fairfield Street, Crane Street and Water Street, for A. Bishop & Co. (Manchester), Ltd., Euxton Street, Ardwick; G. & W. Smith, Ltd., builders, Hyde Grove, Plymouth Grove, Ardwick. Factory, near Medlock Street, Hulme, for H. Goody & Co., Ltd., Croft Street, Pendleton; Robert Carlyle & Co., Ltd., builders, Elsinore Road, Old Trafford. Child welfare centre, Teignmouth Street, Collyhurst, for the Public Health Committee; city architect, Town Hall.

Newcastle-on-Tyne.—Houses (68), Amberley Gardens and the Coast Road, for the Elswick Investment Trust, Ltd.; C. S. Errington, architect, 46, Grainger Street. Houses (312), Blakelaw estate, for C.C.; R. G. Roberts, city architect, 18, Cloth Market. Houses (64), in flats, Howlett Hall estate, for the Maughan Housing Co.; J. R. Wallace, architect, Northumberland Square, North Shields. Cinema, St. Anthony's Road, for A. Buglass; Fennell & Corking, architects, 16, West Street, Gateshead-on-Tyne.

Newcastle (STAFFORDSHIRE).—Houses (250), Chesterton; Shelton Iron, Steel & Coal Co., Ltd., Etruria Hall, Hanley. Houses (40), Pitfield estate; Pitfield Estate Co., Brampton.

Newmarket.—Houses (27), end of King George Avenue, Exning; U.D.C. surveyor, Godolphin House.

Newport (MONMOUTHSHIRE).—Baths, Maindee (£37,026); borough engineer. Secondary school, St. Julian's (£125,445), for E.C.

Northallerton.—School (£33,600); J. Coverdale, architect, County Hall.

Northam (DEVONSHIRE).—Houses (20), Appledore; U.D.C. surveyor.

Paisley.—Houses (1,276), Fergushe Park; borough surveyor.

Peterborough.—School, Walton, for City E.C.

Plymouth.—Houses, Vicarage Road; W. Andrews. Extensions to Treville Street school (£13,955); A. N. Coles, Ltd.

Prudhoe-on-Tyne.—Houses (140); U.D.C. surveyor.

Raunds.—Houses (32), Stanwick; G. Whittam, U.D.C. surveyor, Council Offices, Raunds, Wellingborough.

Rawtenstall.—Houses (36), Turf Pit estate (£17,426); borough surveyor.

Rotherham.—Houses, Aston, Dalton, and Thurcroft; A. E. Lant, R.D.C. surveyor. Houses (20), Howard Road; O. Parkin. School, Clough Bank; borough engineer. Extensions to works, Henry Street, for Henry Garnett & Co.; J. E Knight & Co., Moorgate Street

Rothwell (YORKSHIRE).—Houses (27), Wood Lane and Knightcroft Drive; E. Appleyard.

Rowley Regis.—Houses, Codsall Street (240), and Waggon Street (26); Clifford Buckley, town clerk, Council House, Old Hill, Staffordshire.

Rutland.—School, Great Casterton, for C.C.; W. Rosser, architect, 36, Kingsley Road, Northampton.

St. Albans.—Houses (34), Sleap's Hyde (£13,573); Payne Bros., builders, Leavesden.

St. Helens (LANCASHIRE).—Houses, Link Avenue; J. S. Callon. Houses, Chadwick Road and Litherland Crescent; W. C. Harris, junior.

Salford.—Flats (242), Salford Brow, Strangeways; Salford Housing, Ltd., Chapel Walks, Manchester.

Sheffield.—Houses (25), Wheatley Grove, Athelstan Road; M. Marcroft, Richmond Road. Houses (24) and garages, Hemper Lane; R. Jones, Greenfield Road. Cinema, Eastern Avenue and Errington Road; Sheffield and District Cinematograph Theatres, Ltd. Extensions to Brown Bayleys Steel Works, Ltd.

Shipley.—Houses (12), Nab Wood Road; W. Pitts & Sons.

Skegness.—Houses, near Burgh Road; Simms, Sons & Cook, Ltd., Weekday Cross, Nottingham.

Smallburgh (NORWICH).—Houses (50); R.D.C. surveyor.

Southall.—Factory, Inverness Road; General Industrial Bitumens, Ltd., 55, Pall Mall, London, S.W.1.

Southport.—Factory, near Rufford Road; Hartwood Hosiery Co., Ltd.

South Shields.—Cinema, Ocean Road; Brown, Son & Harding. School, Cleadon, for E.C.; Henderson Brothers, builders, Smith Street, South Shields.

Staffordshire.—School, Aldridge, for County E.C.

Surrey.—Schools, Ash Vale and Effingham Lodge, for County E.C.

Stourbridge.—Houses (102), Hodge Hill, Wollescote (£40,874); Messrs. Griffiths, builders, Wolverhampton.

Sutton Coldfield.—Houses (12), Clarence Gardens; A. Robinson. Massage room for Cottage Hospital; Governors.

Swale (KENT).—Houses (54); H. & C. Smith, builders. Houses (36); R. High & Sons, builders.

Swindon.—Houses (212), Somerset Road, &c.; E. W. Beard, Ltd. Sports stadium, Tydeman Street; Townsend & Co.

Tottenham.—Extensions to London Emery Works Co., Ltd., Marsh Lane.

Wallsend-on-Tyne.—Houses, Dene View, and East Farm estate; J. H. James, builder, West Field. Houses (80), on east of King's Road; W. Leech, builder, 2, Clayton Street, Newcastle-on-Tyne. Houses (132), and cinema and hotel, Willington Farm estate, for the North Heaton Development Co.; Marshall & Tweedy, architects, 129, Pilgrim Street, Newcastle-on-Tyne.

Whiston (LANCASTER).—Houses (624), Bleakhill, for T. Wood.

Winchester.—Conversion of premises into cinema, Station Road, Alresford; Centre Cinemas, Ltd.

Wirksworth.—Houses, near Summer Lane; A. Eaton & Sons, architects, 6, The Strand, Derby.

Worcestershire.—School, Halesowen, for County E.C.; A. V. Rowe, county architect, 38, Foregate Street, Worcester.

Worthing.—Houses (20), Nutley Crescent; Nutley Estates, Ltd. Houses (24), Southways Avenue; Sompting Manor Estate, Ltd. Houses, near Stone Lane; Sands & Co. Eleven blocks of flats, South Farm Road; Centrecourt Investment Co. Library, Durrington; borough engineer.

York.—Houses (148) and flats, Gale Lane (£65,250); Sherriff & Co., Ltd. School, Water Lane estate, for E.C.